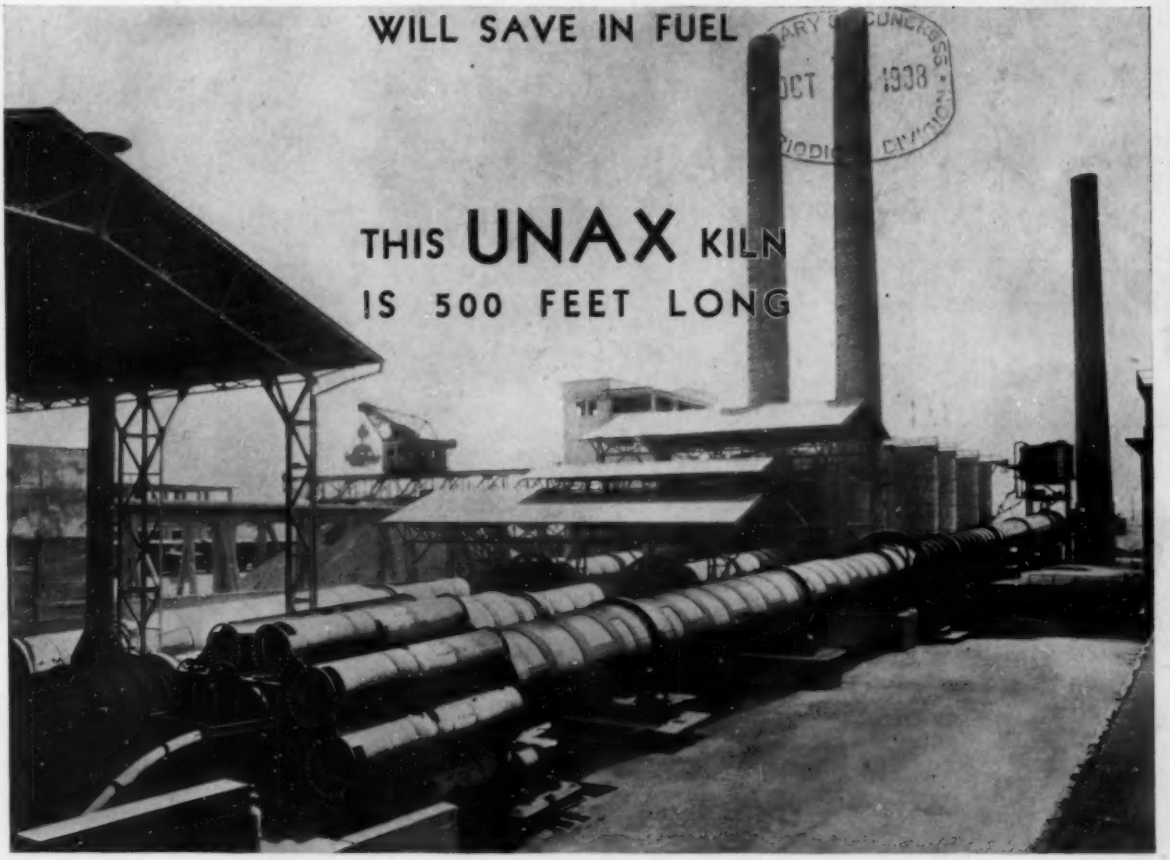
Rock Products

THE INDUSTRY'S RECOGNIZED AUTHORITY

MODERN ROTARY KILNS



F. L. SMIDTH & CO.

225 BROADWAY — CEMENT ENGINEERING, CEMENT MACHINERY — NEW YORK, N. Y.

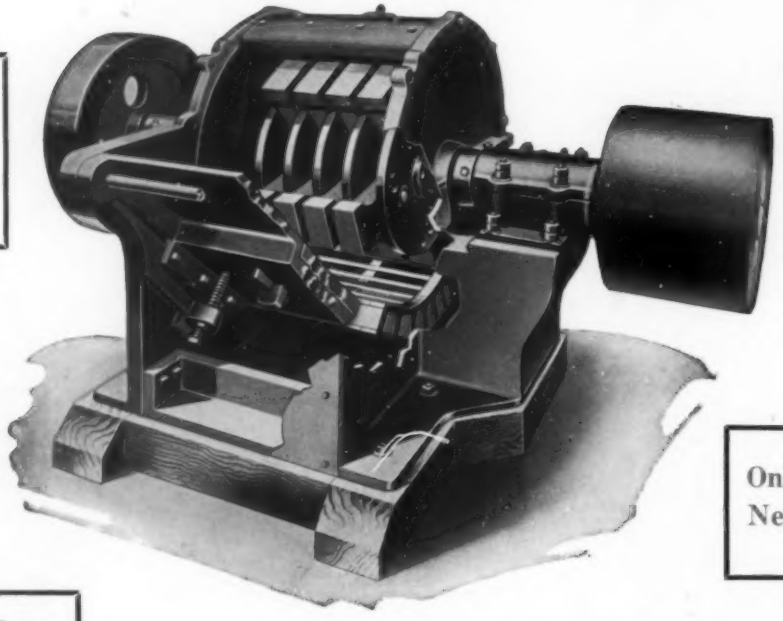
SEPTEMBER, 1938

Handle Larger Rock

WHY MORE PLANTS ARE INSTALLING • WILLIAMS • HAMMER CRUSHERS

Better Control Over Size of Product

Reduces to Desired Size • • • in one operation

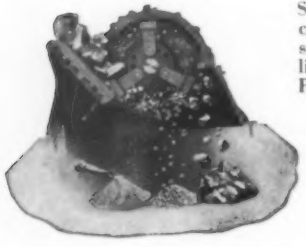


Jumbo Junior Crusher with section removed to show crushing parts.

Cubular Stone • • • No Slivers

Only One Crusher Needed for the Job

25% to 75% Less Investment • • • Cheaper Crushing



Sectional view of crusher used to show the Williams Hammer Principle of crushing.

If you plan additional rock crushing equipment investigate Williams Hammer Crushers. Usually one Williams will take the place of two or three other crushers at a considerable saving in investment and operating costs. Thirty sizes make it easy to select exactly the proper machine for your work. Large sizes handle power shovel loaded stone and crush to 2″, 1¼″ or smaller. Smaller sizes handle screen rejects or hand-loaded rock and reduce to 1¼″, 3″ or agstone. Get our recommendations on your crushing, pulverizing, screen or air separation job.

. . . *Write for illustrated bulletins* . . .

The Williams Patent Crusher & Pulverizer Co.

800 St. Louis Avenue • ST. LOUIS, MO.

Sales Agencies in All Principal Cities Including

Chicago	New York	San Francisco
37 W. Van Buren St.	15 Park Row	326 Rialto Bldg.

THE WILLIAMS PATENT CRUSHER & PULVERIZER CO. ST. LOUIS, MO. U.S.A. TRADE MARK

REG. U.S. PAT. OFF.

Williams

OLDEST AND LARGEST BUILDERS OF HAMMERMILLS IN THE WORLD

PATENT CRUSHERS GRINDERS SHREDDERS

● Prepared to meet and master industry's hard chain jobs, groomed to outlast any other type of cast ferrous chain, ready to beat shock, fatigue, and tension—that's Link-Belt PROMAL!

Because PROMAL can "PUNCH" and "TAKE IT," it has won the respect of engineers through years of competition in which it has never called for quarter.

Champion by right of conquest, PROMAL can protect you from expensive shut-downs and replacements. Get the record—Send for catalog. Address the nearest office.

Link-Belt Company, Indianapolis, Chicago, Philadelphia, Atlanta, San Francisco, Toronto, or any of our other offices, located in principal cities. 7008

THE SYMBOL OF QUALITY · LINK-BELT · LB

LINK-BELT *Promal* CHAINS

FOR CONVEYING AND POWER TRANSMISSION

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Rock Products

With which has been consolidated the journals

CEMENT and ENGINEERING NEWS — Founded 1896 — CONCRETE PRODUCTS — Est. 1918

RECOGNIZED THE WORLD OVER AS THE LEADER IN ITS FIELD

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ROCK PRODUCTS
Bears the Twin Hall-Marks of Known Value

Impartial measurement of reader interest in terms of paid circulation

Authentic facts relating to editorial scope and readership analysis

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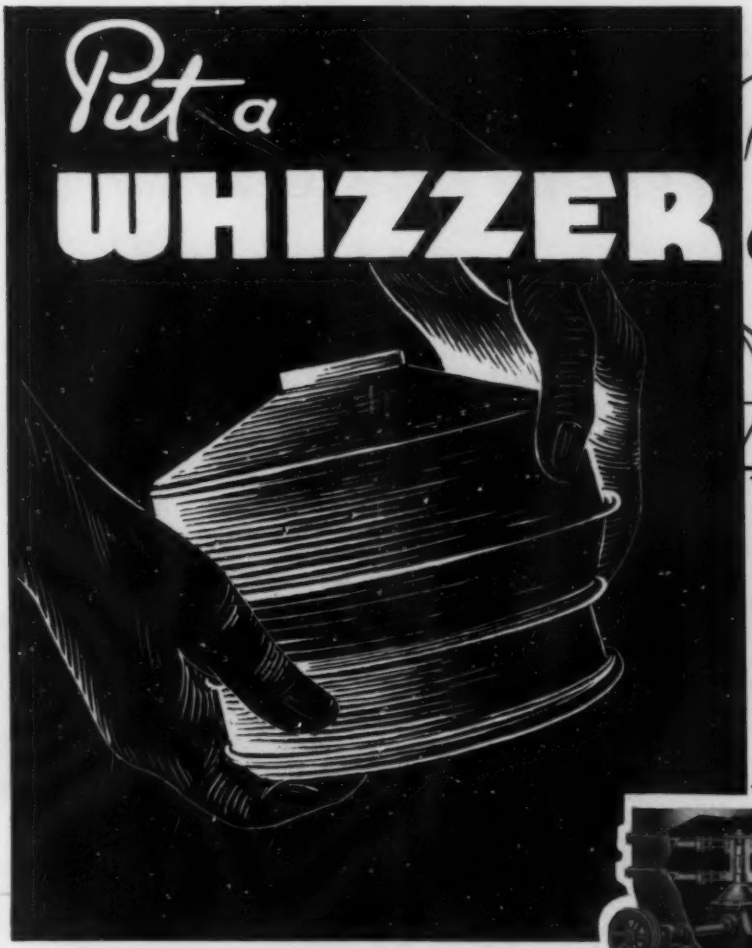
Put a WHIZZER on Your ROLLER MILL



RAYMOND WHIZZER-EQUIPPED ROLLER MILL

OVER ONE HUNDRED-FIFTY INSTALLATIONS tell a remarkable performance record of the Whizzer Separator—a Raymond development that has revolutionized the modern Roller Mill.

Whether furnished on a new machine or applied to an old one, this super-classifier produces these amazing results:—

50% to 100% Increased mill capacity
25% to 50% Reduction in power costs
80% minus 100-mesh to 99.99% through 325-mesh fineness, controlled by a simple lever shift on the variable speed transmission.

You can raise the efficiency of your present roller mill by equipping it with a Whizzer Separator in place of the old type unit—and get a definite increase in capacity.

And if you are buying a new Roller Mill, you will want to choose a Raymond, so you can secure the many patented features which have kept the Raymond Roller Mill ahead of the field in efficiency, capacity and economy for half a century.

Write for Bulletin

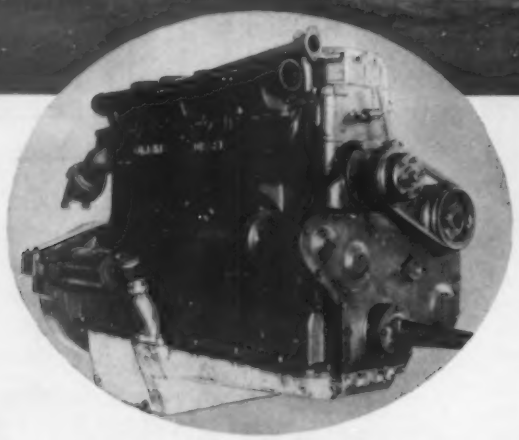
RAYMOND PULVERIZER DIVISION
COMBUSTION ENGINEERING COMPANY, INC.
1307 North Branch Street CHICAGO
Sales Offices in Principal Cities • • • In Canada: Combustion Engineering Corporation, Ltd., Montreal

CUMMINS DIESEL OPERATES

100,000 MILES...

"without removing the head"

Cummins Diesel-powered truck and trailer, operated by the St. Johns River Line Company, Jacksonville, Fla., hauling general freight.



Cummins Diesel Engine HB-4 like that installed in above truck-trailer combination. This engine and all other Cummins models can be perfectly lubricated with Texaco Diesel Lubricants.

AND NOT ONLY THIS—when opened up last January 24, this Cummins Diesel was found to be *Clean*, while the greatest wear on cylinder liners was only .006 inch.

Here's the important point—ever since it went into service in 1936, this engine has been lubricated exclusively with Texaco Ursa Oil.

To keep *your* Diesel engines in top condition, use Texaco Ursa Oil Series which can be obtained through any of 2108 Texaco warehouse plants.

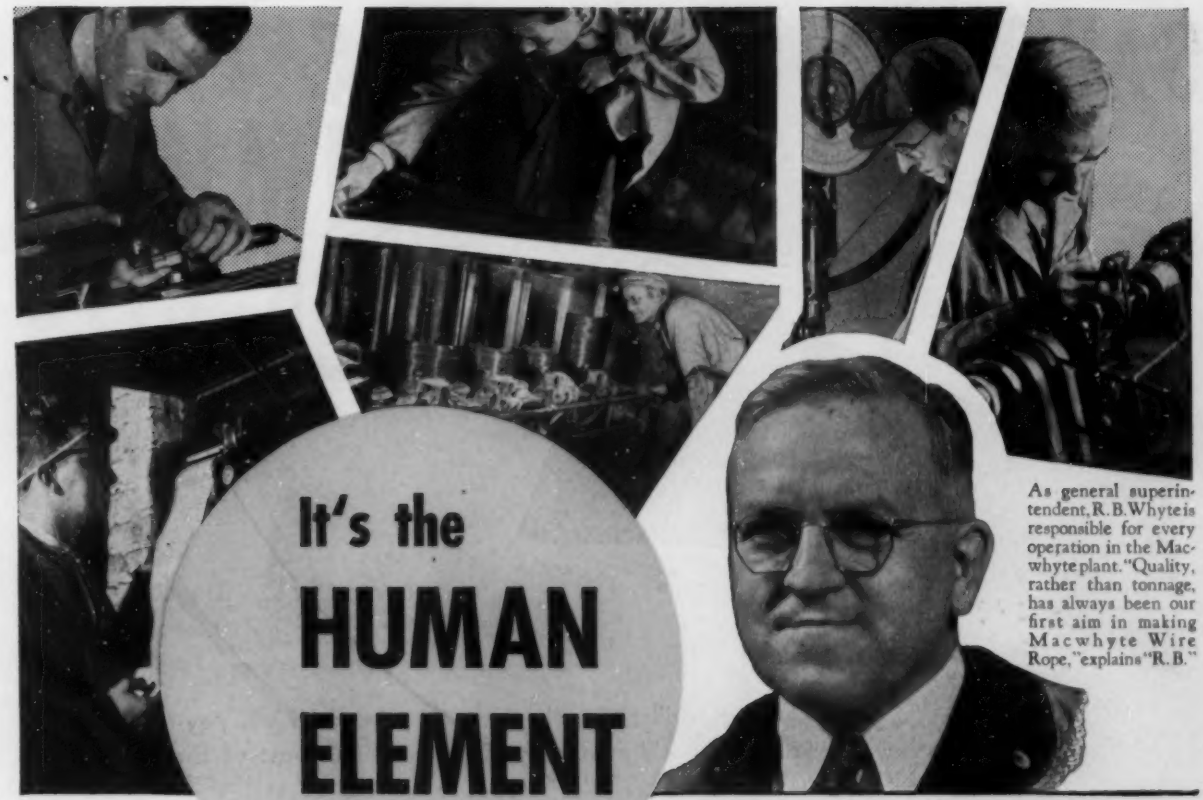
For the address of the nearest one write:

The Texas Company, 135 East 42nd Street, New York City.

TEXACO

TEXACO *Ursa Oils*

FOR AUTOMOTIVE DIESELS



As general superintendent, R. B. Whyte is responsible for every operation in the Macwhyte plant. "Quality, rather than tonnage, has always been our first aim in making Macwhyte Wire Rope," explains "R. B."

It's the HUMAN ELEMENT that controls the quality of Macwhyte PREformed Wire Rope

● Why do some makes of wire rope give much better, much longer, service than others?

You know most of the reasons: better materials . . . efficient manufacturing equipment . . . rigid laboratory and field tests. These are absolutely necessary in building long life into wire rope.

But *most important* in manufacturing *better* wire rope are the *men* who make it!

Men, as well as materials, control quality

"We use the finest steels, the most modern machinery," explains R. B. Whyte, General Superintendent, "but it's the 'human element' that controls the high quality you find in Macwhyte PREformed.

Quality, rather than tonnage, Macwhyte aim

"We've always based compensation on quality workmanship, never tonnage. As a result our workmen take a pride in their jobs. They've become experts in their lines. And the Macwhyte Wire Rope they make is *better* wire rope."

Over the years, this policy of "quality rather than tonnage" has proved sound. For today there are more users of Macwhyte PREformed and Regular Wire Rope than ever before.

MACWHYTE COMPANY
KENOSHA, WISCONSIN

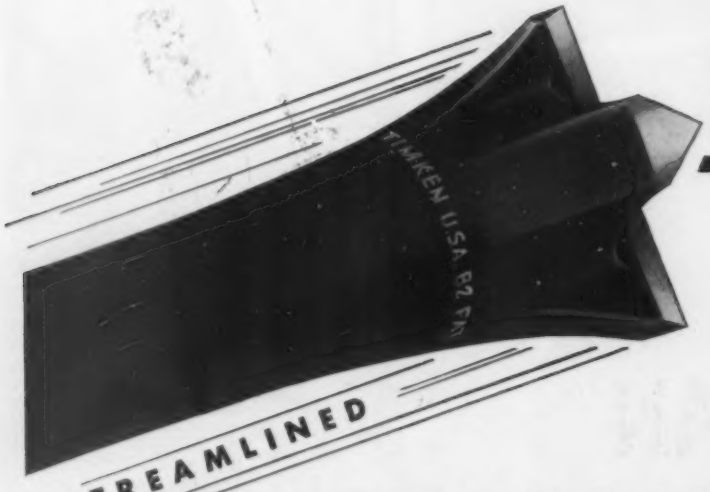
Manufacturers of wire rope and braided wire rope slings.

Distributors and stock throughout the U. S. A. for quick service.

MACWHYTE
Whyte Strand – PREformed

THE WIRE ROPE WITH THE INTERNAL LUBRICATION

SAVE YOUR DRILLERS' TIME WITH TIMKEN ROCK BITS



You pay your rock drillers for the time they work. It will pay you to give them tools that will enable them to make the most of their time —TIMKEN Rock Bits.

A driller can put down more holes in a given time at lower cost with TIMKEN Bits than with the best forged steel he has ever used. TIMKEN Bits *drill faster* and *last longer* because of their streamlined design, shoulder construction and the TIMKEN Electric Furnace Steel of which they are made.

TIMKEN Bits, being removable, reduce steel handling on the job. When a bit becomes too dull to drill effectively the driller simply unscrews it, puts on a new one and goes right on drilling. This also is a definite source of time saving.

The New 20TH CENTURY LIMITED rolls on TIMKEN Bearings.
GLIDE—as you ride a Timken Bearing-equipped train

The removable feature is responsible for another big economy—elimination of reforging cost with its incidental expense, maintenance of forging equipment and investment in steel. Due to their great depth of hardness, TIMKEN Bits can be resharpened several times by a comparatively simple grinding operation, each resharpening giving them a new lease on life.

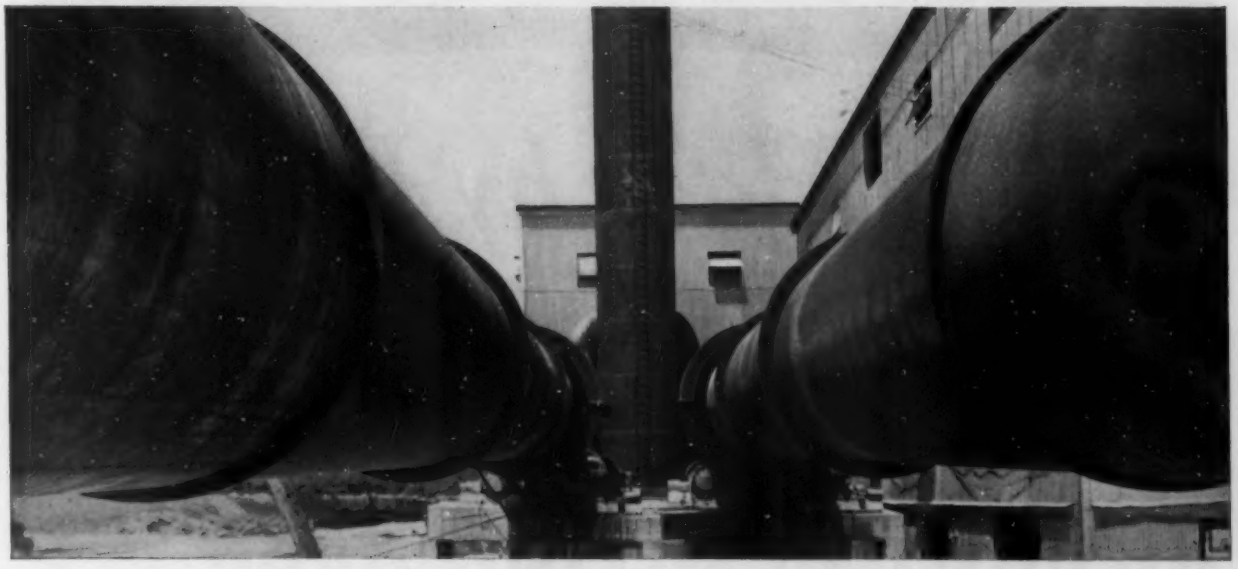
The sooner you adopt TIMKEN Rock Bits the more you will save. Why not adopt them now? We will be glad to arrange a demonstration at any time.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

Manufacturers of TIMKEN Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; TIMKEN Alloy Steels and Carbon and Alloy Seamless Tubing; TIMKEN Rock Bits; and TIMKEN Fuel Injection Equipment.

TIMKEN
ROCK BITS

when speaking of ROTARY KILNS "TRAYLOR" *means "Leadership"*



Leadership, in its true sense, is a quality not to be had by laying claim to or by being conferred,—it is always the product of work, generally hard work and often grievously so.

That's the kind of leadership Traylor enjoys in the manufacture of Rotary Kilns and allied equipment. We have built miles of kilns for the most exacting engineers in the world. We have pioneered major improvements and devices that today are considered standard specifications. Our reward is the satisfaction voiced by our good friends, the users, and their endorsement by the eminently practical method of ordering duplicate units.

Our latest contribution is full-welded construction, for which we have designed and built special working and handling shop equipment to produce best results. Two welded kilns are shown in our photograph. We have built this type up to a length of four hundred feet, in shop and field.

Welded Kilns have many advantages and can be purchased for the price of ordinary kinds. We would appreciate the privilege of presenting to you facts that fully support our statements. To that end, will you be good enough to write us, today, outlining your problems? Thank you!

WE BUILD

Rotary Kilns
Rotary Coolers
Rotary Dryers
Rotary Slakers
Scrubbers
Evaporators
Jaw Crushers
Gyratory Crushers
Reduction Crushers
Crushing Rolls
Grinding Mills
Ball Mills
Rod Mills
Tube Mills
Pug Mills
Wash Mills
Feeders
Rotary Screens
Elevators
Welded or Riveted Stacks, Tanks and Bins for any purpose.

TRAYLOR ENGINEERING & MANUFACTURING CO.

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DEPENDABLE

Made by Du Pont

OVER FOUR

DU PONT BLASTING CAPS and HAVE BEEN

THE use of dependable detonators is essential to safer blasting.

That's why more than 4,300,000,000 Du Pont Blasting Caps and Electric Blasting Caps have been sold and used.

This astounding figure proves the public's confidence in detonators made by Du Pont. It proves that Du Pont detonators are the overwhelming choice of men who know blasting . . . because these detonators give dependable performance under all kinds of field conditions.

DON'T RUN THE RISK OF MISFIRES . . . REMEMBER — THE

DU PONT REG. U.S. PAT. OFF. **EXPLOSIVES** *and*

DETONATORS

...*Proved by* YOU!

BILLION

ELECTRIC BLASTING CAPS SOLD AND USED...

Du Pont detonators are manufactured under the most rigid conditions with the most modern equipment and testing devices known to science.

They are the result of constant research—on Du Pont proving grounds and in the field—to give you the utmost in dependability.

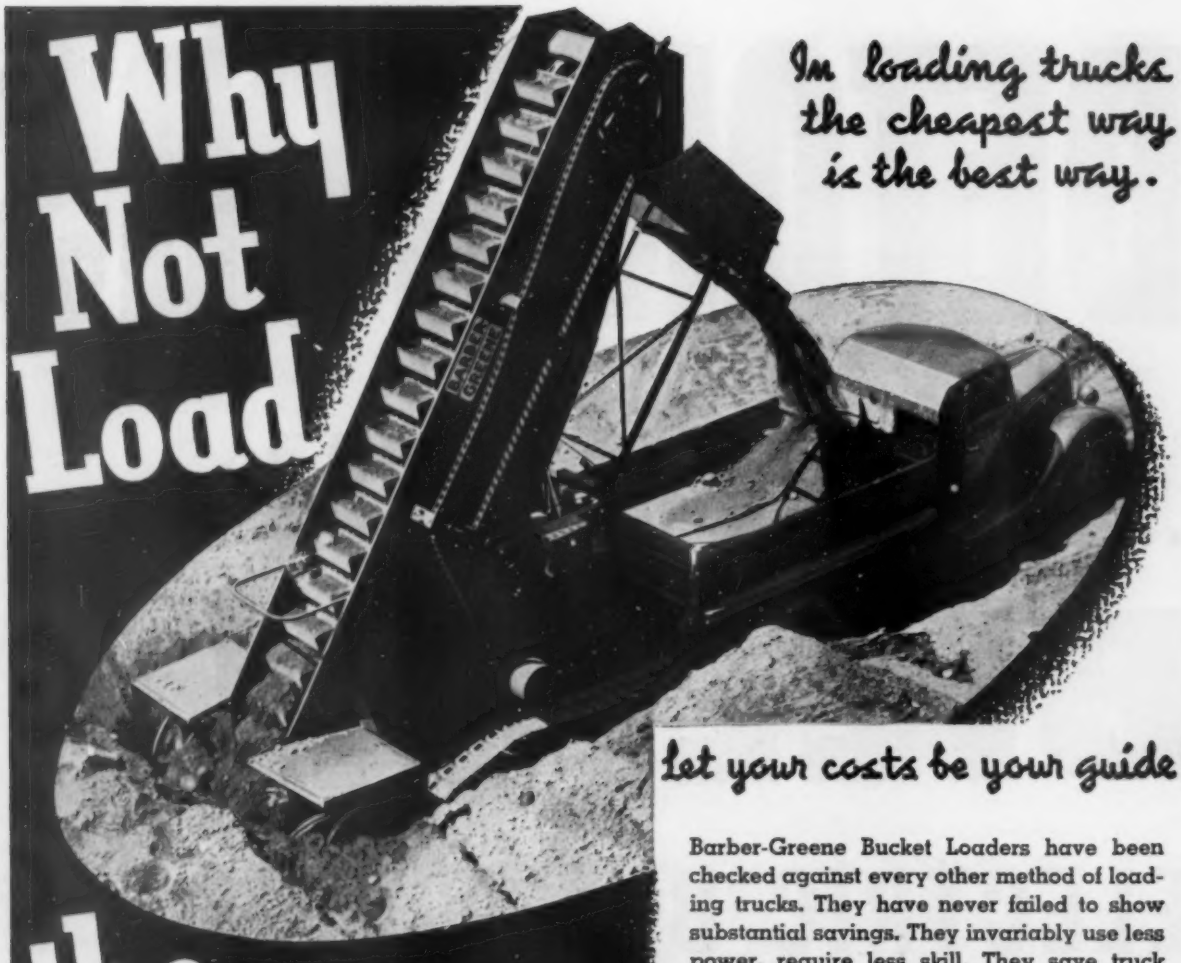
In the future, as in the past, Du Pont will continue to make the most dependable detonators—*and hence the safest detonators.* E. I. du Pont de Nemours & Co., Inc., Explosives Dept., Wilmington, Delaware.

MOST DEPENDABLE DETONATOR IS THE SAFEST DETONATOR

BLASTING ACCESSORIES

Why Not Load the Cheapest Way?

In loading trucks the cheapest way is the best way.



let your costs be your guide!

Barber-Greene Bucket Loaders have been checked against every other method of loading trucks. They have never failed to show substantial savings. They invariably use less power, require less skill. They save truck time, man time, job time. Their versatility makes them useful the year 'round for all types of loading, stripping, light excavating, and unloading cars. They are available with gravity, shaker or high capacity vibrating screens.

The mechanical design and exclusive features of the Barber-Greene place it way ahead in quality, dependability, and ease of operation.

Write now for full information. There is no obligation.

Barber-Greene Company
Aurora, Illinois

• STANDARDIZED MATERIAL HANDLING MACHINES •

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Cleveland · Chicago · New York
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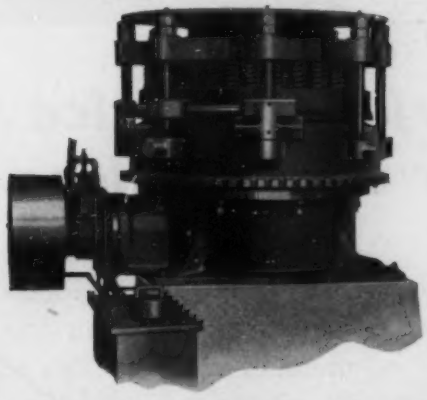
Standardized Belt Conveyors
CARRIERS
Portable CONVEYORS
and other standardized unit parts
Permanent CONVEYORS
SNOW LOADERS for high speed removal
MIXERS for Bituminous or Stabilized Mixing · · · Central or Travel Plant
Leveling-Tamping FINISHERS
LOADERS for lowest cost loading
Vertical Boom DITCHERS
Low Cost-High Quality Road Construction

Plus PERFORMANCE *minus* MAINTENANCE

finer crushing—a more cubical product

higher speed and greater tonnage

better built for longer life and lower up-keep



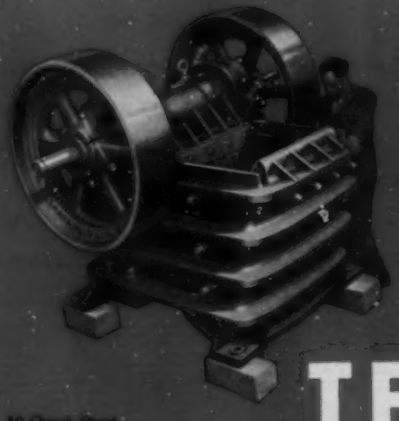
TELSMITH GYRASPHERE CRUSHER

takes an unlimited and unregulated choke feed when other secondary crushers can't. Like a mortar and pestle... only inverted for easy discharge ... the spherical head and its corresponding concave catch and break chunks of rock between two multi-curved surfaces—a perfect *cubing* action. A finer, faster secondary crusher that takes less power ... and less up-keep. *Write for descriptive Bulletin Y-11*

You get more crushing strokes per minute with the Telsmith-Wheeling Jaw Crusher...and greater reduction in *one* process. Roller bearings almost double capacity, cut power consumption per ton, reduce up-keep. Because its frame and jaw are massive steel castings, its shaft a big steel forging—Telsmith is almost a permanent investment. Adjustable for a wide range of product sizing. Seven sizes. *Write for Bulletin W-11.*

Sand, gravel, crushed rock, ore, coal—Telsmith Pulsator screens 'em all, wet or dry, and does it *right.* Its circular movement produces a maximum screening action that's *uniform* on every inch of the wire, regardless of load. Telsmith builds in greater value, longer life and lower up-keep with the toughest alloy steels, anti-friction bearings and special seal protection for working parts. Single, double or triple deck; 11 sizes. *Write today for Bulletin V-11.*

TELSMITH-WHEELING JAW CRUSHER



TELSMITH PULSATOR

TELSMITH

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713 Commercial Trust Bldg., Philadelphia, Pa.
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Brandeis M. & S. Co., Louisville, Ky.
Choctaw C. & M. Co., Memphis, Tenn.

Associates in Canada, Canadian Vickers, Limited, Montreal and Vancouver

MC-9

SMITH ENGINEERING WORKS, 508 E. CAPITOL DRIVE, MILWAUKEE, WIS.

European Cement Mills reduce grinding costs

Surpass American practice by crushing cement clinker to a smaller size mill feed

Wherever fine crushing and grinding is done, it has become an accepted fact that it is more economical to reduce by crushing than it is to grind with a coarse grinding mill feed. This has long been recognized in the mining industry where Symons Short Head Cones are being used for fine crushing by major metal producers everywhere. Within the past few years, this practice has also been adopted by cement mills in Central Europe where Symons Cones are crushing kiln run clinker to grinding mill feed at a substantial saving over methods previously used. Here is the average analysis of feed to grinding mills in some of the European plants:

Minus 4 mesh — 80 to 90 per cent.
Minus 8 mesh — 60 to 70 per cent.
Minus 20 mesh — over 20 per cent.
Minus 200 mesh — over 8 per cent.

The Symons Short Head Cone Crusher was primarily developed for extremely fine crushing and is especially suited for crushing cement clinker to a more desirable grinding mill feed. Further information on the performance of Symons Cone Crushers and their application for cement mills will be sent upon request.

Some Advantages Of Crushing Clinker With SYMONS CRUSHERS

- Smaller feed increases grinding mill output with same power input.
- Smaller feed eliminates the need of large grinding balls and lengthens liner life.
- Lowers the cost of cement production and increases profits.

NORDBERG MFG. CO., MILWAUKEE, WIS.

NEW YORK • LOS ANGELES • TORONTO • LONDON

JAEGER again steps ahead with the most important truck mixer improvement in 8 years . . .

1.

SYPHO-METER WATER TANK

accurate within a fractional percent of tank capacity regardless of tank position or splashing on rough roads. Valve can even be left open on long hauls with perfect safety.

2.

DUAL REVOLVING WATER SPRAYS

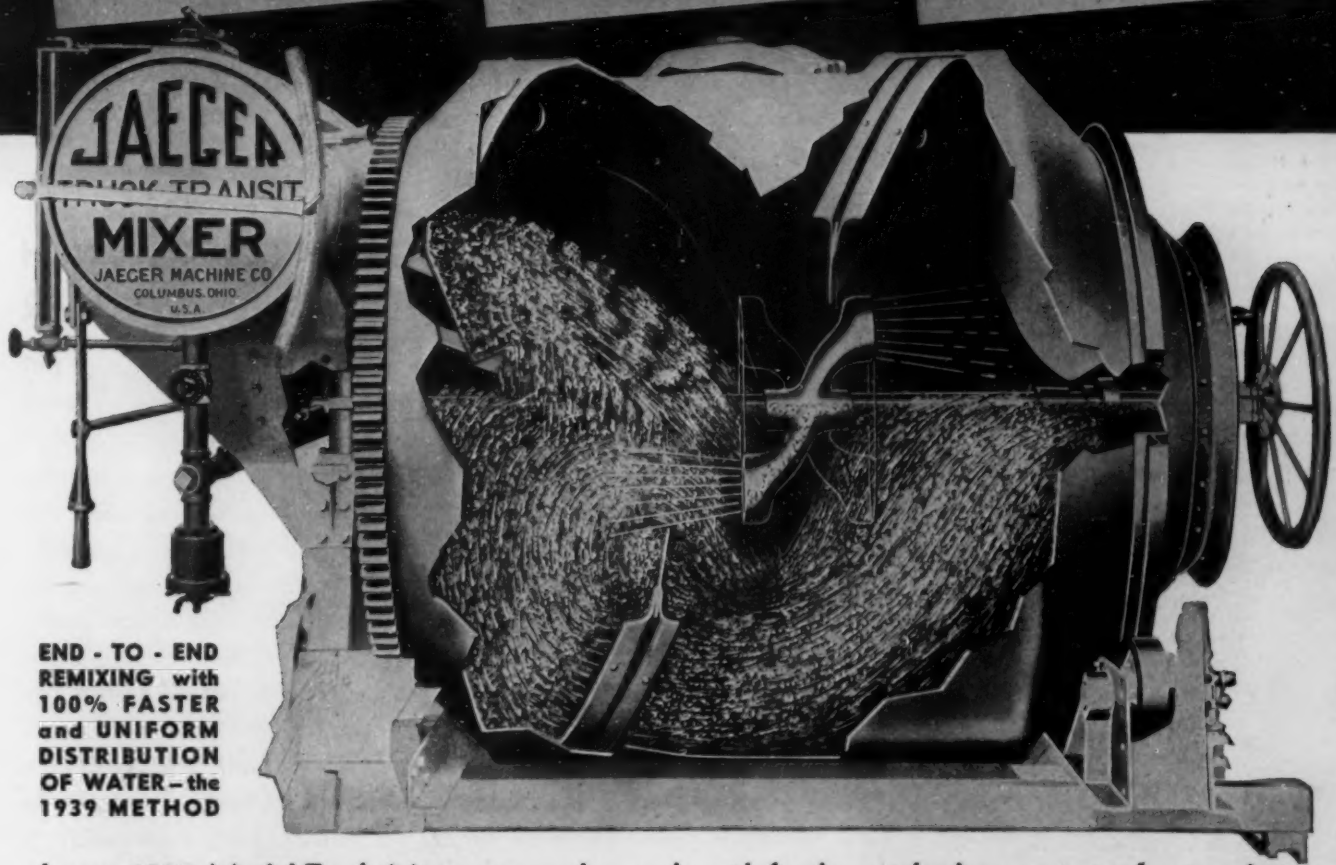
Giving 100% Faster, Uniform Water Distribution — Clear Path as They Revolve, Spray into and Over Mass in both directions, from end to end of drum!

3.

Combine with Jaeger Reversing, End-to-End Mixing Action to insure a Higher Strength, More Uniform, More Workable and

MORE SALABLE CONCRETE

Even on the Shortest Hauls.



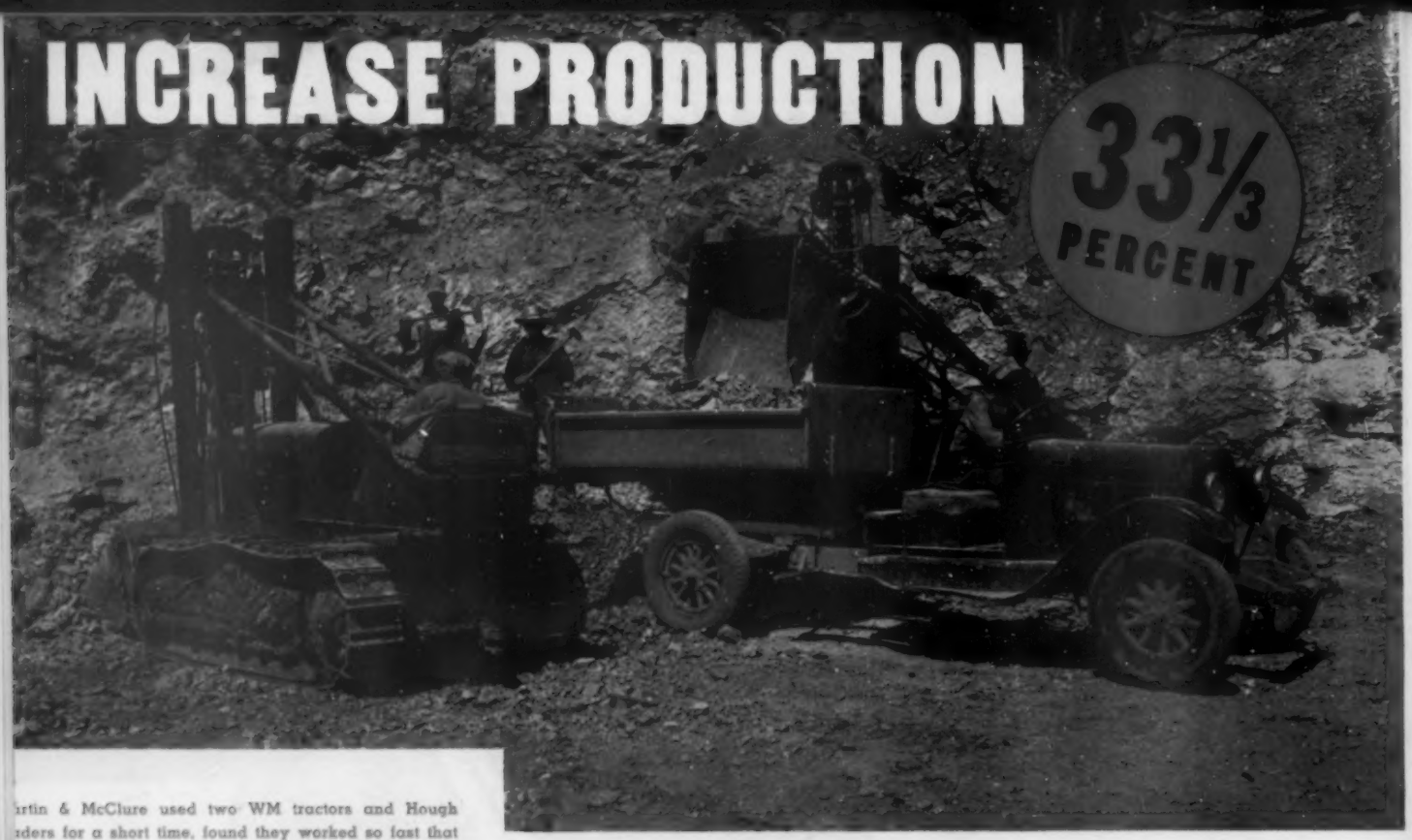
END - TO - END REMIXING with 100% FASTER and UNIFORM DISTRIBUTION OF WATER – the 1939 METHOD

Jaeger 1939 Model Truck Mixers are ready--ready with fundamental advances in truck mixer design --ready to produce the highest quality transit-mixed concrete ever offered to contractors, architects and engineers--ready to win customers and profits for Jaeger operators in one of the most actively expanding industries in America today.

Our new bulletin "ADVANCE INFORMATION ON JAEGER 1939 MODEL TRUCK MIXERS" gives full details. Send for your copy--today.

THE JAEGER MACHINE CO.
603 Dublin Avenue Columbus, Ohio

INCREASE PRODUCTION



rtin & McClure used two WM tractors and Hough
aders for a short time, found they worked so fast that
e could easily handle their stripping, loading and
ckpiling. In addition to this Allis-Chalmers outfit,
y use two A-C Power Units to drive a rock crusher
d an A-C Pulverator.

d and Hough loader stripping overburden. If de-
d a bulldozer blade can be substituted for the bucket.
change requires less than 10 minutes.

. . . CUT OPERATING COSTS WITH WM TRACTOR AND HOUGH LOADER

To cut stripping costs this spring Martin & McClure put an Allis-Chalmers WM tractor and Hough loader to work removing overburden from their limestone rock quarry near Colchester, Illinois. This outfit easily kept stripping operations far enough ahead so it also could be used for loading trucks in the pit and for handling lime and aggregate from stockpiles to trucks. Martin & McClure figure it increases their output 33-1/3%, eliminates much back-breaking hand work and reduces labor costs nearly two-thirds. You can increase production and cut costs in the same way, by using the WM tractor and Hough loader. Bucket has full ½-yard capacity. Will dig and load into trucks at the rate of 30 to 40 yards an hour. Loads from stock pile at rate of 40 to 50 yards hourly. Drawbar is always free for pulling purposes. Unit can be easily and quickly towed from one pit to another on its own transport wheels.

Ask your Allis-Chalmers dealer how this fast-operating outfit can help you.

Gasoline and Controlled Ignition Oil Track-Type Tractors from 32 to 80 Drawbar H. P. . . . Tandem and Single Drive Speed Patrols . . . Drawn Blade Graders . . . Industrial Wheel Tractors . . . Stationary Power Units from 31 to 102 Brake H.P. . . . two, four and six-wheel scrapers, bulldozers, trailbuilders, loaders, winches and other allied equipment.

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TRACTOR DIVISION—MILWAUKEE, U. S. A.

MANUFACTURERS OF ROLL JAW CRUSHERS INVARIABLY

USE SKF

BUILT BY KENNEDY-VAN SAUN MFG. & ENG. CO.

SKF-EQUIPPED

Men who built this Roll Jaw Crusher think of bearings in terms of ruggedness, high capacity, long life, and reliability.

They think of them in terms of what they will do over a period of years in the abrasive atmosphere of a quarry.

Naturally, the bearings they chose for this application are self-aligning, self-contained units well-protected against abrasives. They are high in capacity, low in maintenance costs, long on performance—always avoiding trouble. You know the bearings, too; they are SKF.

SKF INDUSTRIES, INC.
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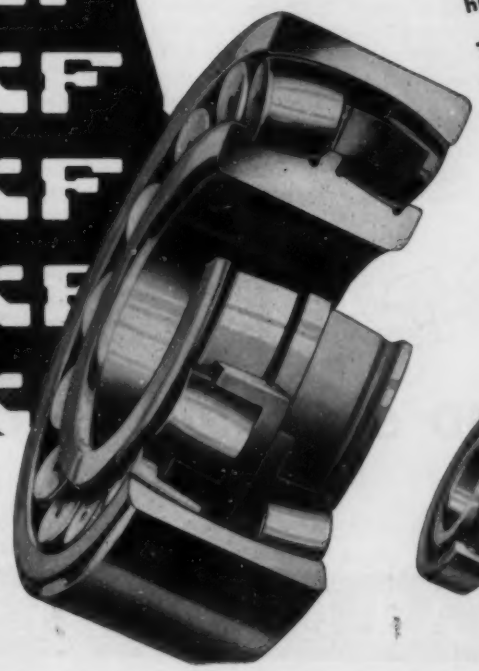
4162



SKF makes more types and sizes of ball and roller bearings than any other manufacturer in the world.

19 months of *Continuous* wear

. . . *and barely started!*

7 ft. tube mill, 20 ft. long. Installed Nov. 1935. Estimated continuous service, 19 months. The streaky appearance at the left is from frozen slurry. Note that there is practically no wear on the plates, and that lifting bars are worn only slightly on the receiving side—and remember after further wear, these bars can be reversed.

U·S·S Lorain Rolled Steel Plate Linings are easy to install. Their lighter weight makes handling easier than heavier cast materials.

* * *

The high carbon rolled steel plate linings are chamfered to suit design of lifting bars. The bars hold the plates firmly in place.

— unretouched photo shows years of service left in Lorain Lining after 19 months of continuous service in wet grind mill.

LOOK at the condition of this lining. Note how much lifting edge there is after the gruelling service of wet-mill grinding of cement slurry. A lot of wear left before lifting bars or plates need be reversed. With Lorain Lining you get full wear from both bars and plates—for both are reversible. Thus the final discard is considerably less than is possible with any other type of mill liner. A higher percentage of the original steel is used and replacement costs are thereby reduced accordingly.

At the time this picture was taken this liner had been in service almost as long as the full life of the liner it replaced. And more years of service ahead. That's why you save money when you equip your mills with Lorain Rolled Steel Plate Lining.

Let us show how U·S·S Lorain Rolled Steel Plate Lining can be fitted to *your* mills to improve efficiency and reduce cost and time for replacements. A word from you will bring an engineer to work with you on proper design for your mills.

U·S·S LORAIN ROLLED STEEL PLATE LINING

CARNEGIE-ILLINOIS STEEL CORPORATION

Lorain Division, *Johnstown, Pa.*

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*

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UNITED STATES STEEL

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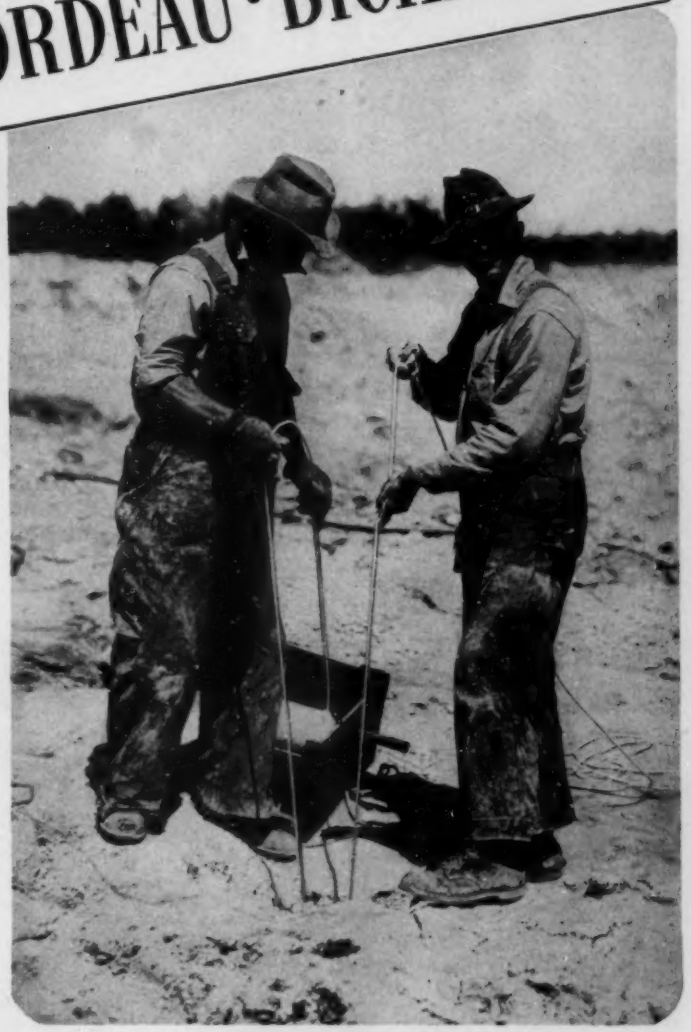

. . . because Cordeau - Bickford Detonating Fuse permits quicker loading, tamping and stemming of each hole. Cartridges may be slipped down alongside the taut line of Cordeau, which remains in direct contact with the whole charge and detonates it at the proper time with the greatest effectiveness.

CB76

THE ENSIGN-BICKFORD COMPANY
SIMSBURY, CONN.

CORDEAU·BICKFORD *Detonating Fuse*

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AIR SEPARATORS

241
232
229
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212
200
192
187
179

Here's why 241 have been installed by the Cement Industry

These STURTEVANT Air Separators installed in "Closed Circuit" systems of grinding allow both Mills and Separators to function according to their design; the one to grind and grind only without handicap or hindrance, and the other to select and remove the finished product from the pulverizers easily, freely and as soon as made. The result is an increase in mill capacities of from 25 to 300%.

In addition STURTEVANT Air Separators Control Particle Size, Control Specific Surface Area, Lower Mill and Product Temperatures and Reduce Production Costs.

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The Popular Choice ★ BLAW-KNOX TRUKMIXERS and Agitators

★ Preferred by contractors, engineers, and users *because:*

. . . they mix concrete faster and more thoroughly.

. . . they produce high strength concrete of maximum workability.

. . . the exclusive Blaw-Knox Water Measuring System is accurate and dependable.

. . . Blaw-Knox Trukmixers are free from breakdowns and delays, insuring continuous dependable service.

. . . they have greater durability due to the use of high quality materials and superiority of design.

. . . ease and speed of operation mean more trips and greater profits.

The desirable and popular features of Blaw-Knox Trukmixers and Agitators are completely illustrated and described in the new Blaw-Knox Catalog No. 1582. *Send for your copy.*

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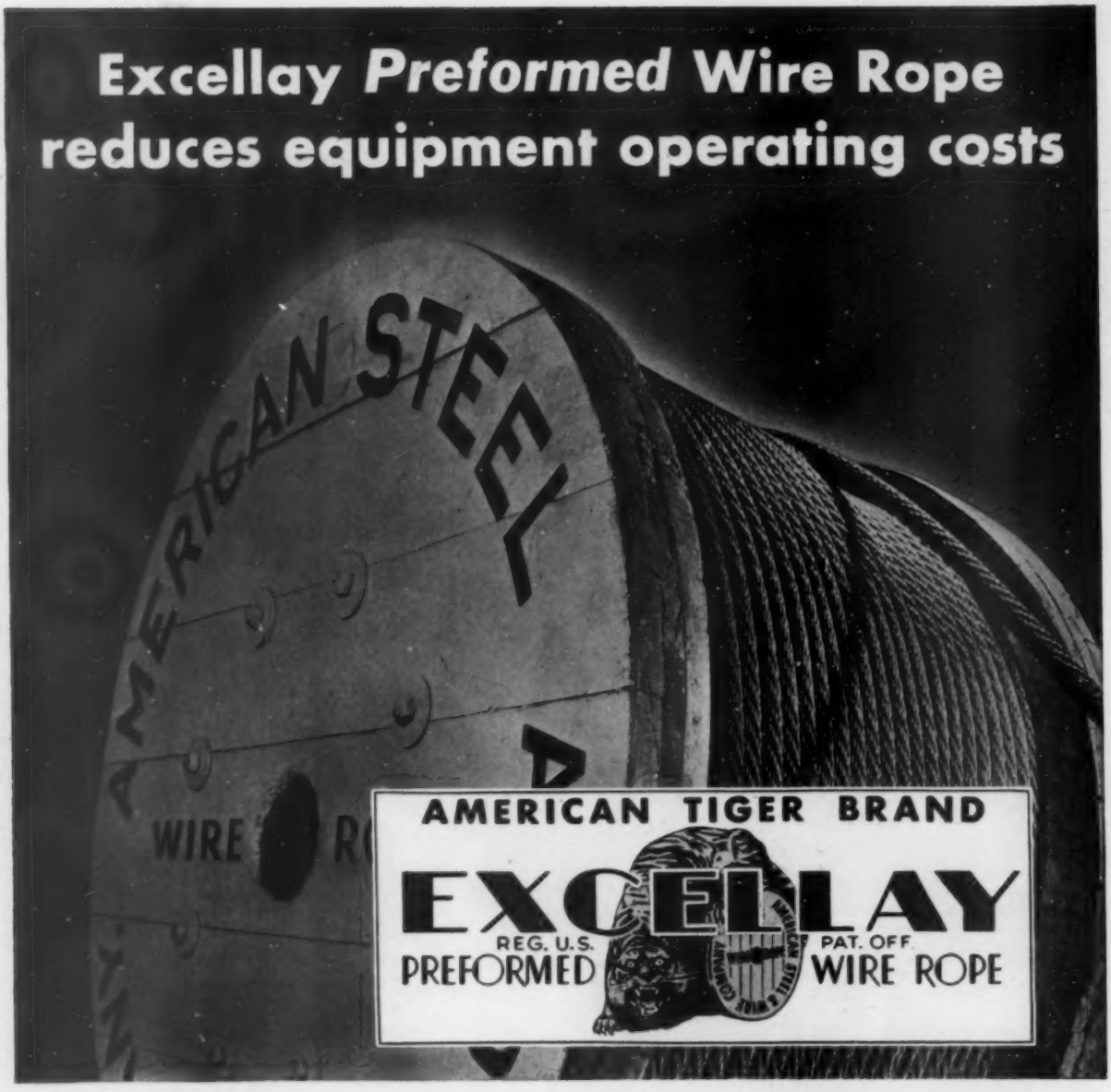
The Reason—
Users Compare the Details and Then Buy

BLAW-KNOX

What Helps Business Helps You!

Excellay *Preformed* Wire Rope reduces equipment operating costs



WIRE rope users are turning more and more to American Tiger Brand EXCELLAY Preformed Wire Rope because its many advantages can be summed up in a single word — *Economy*.

EXCELLAY Preformed Wire Rope is "relaxed." It is free from the internal stresses present in standard rope. This enables it to withstand fatigue to a greater degree. It does not break up so quickly from abrasive wear. It resists kinking and winds smoothly and easily on the drums, reducing uneven wear and drum abuse. It is easier to splice, easier to install, and safer to handle.

Specify EXCELLAY Preformed Wire Rope and get greater value for your money. Our engineers will be glad to cooperate with you.

You can depend upon the wire rope on the Yellow Reel

AMERICAN STEEL & WIRE COMPANY

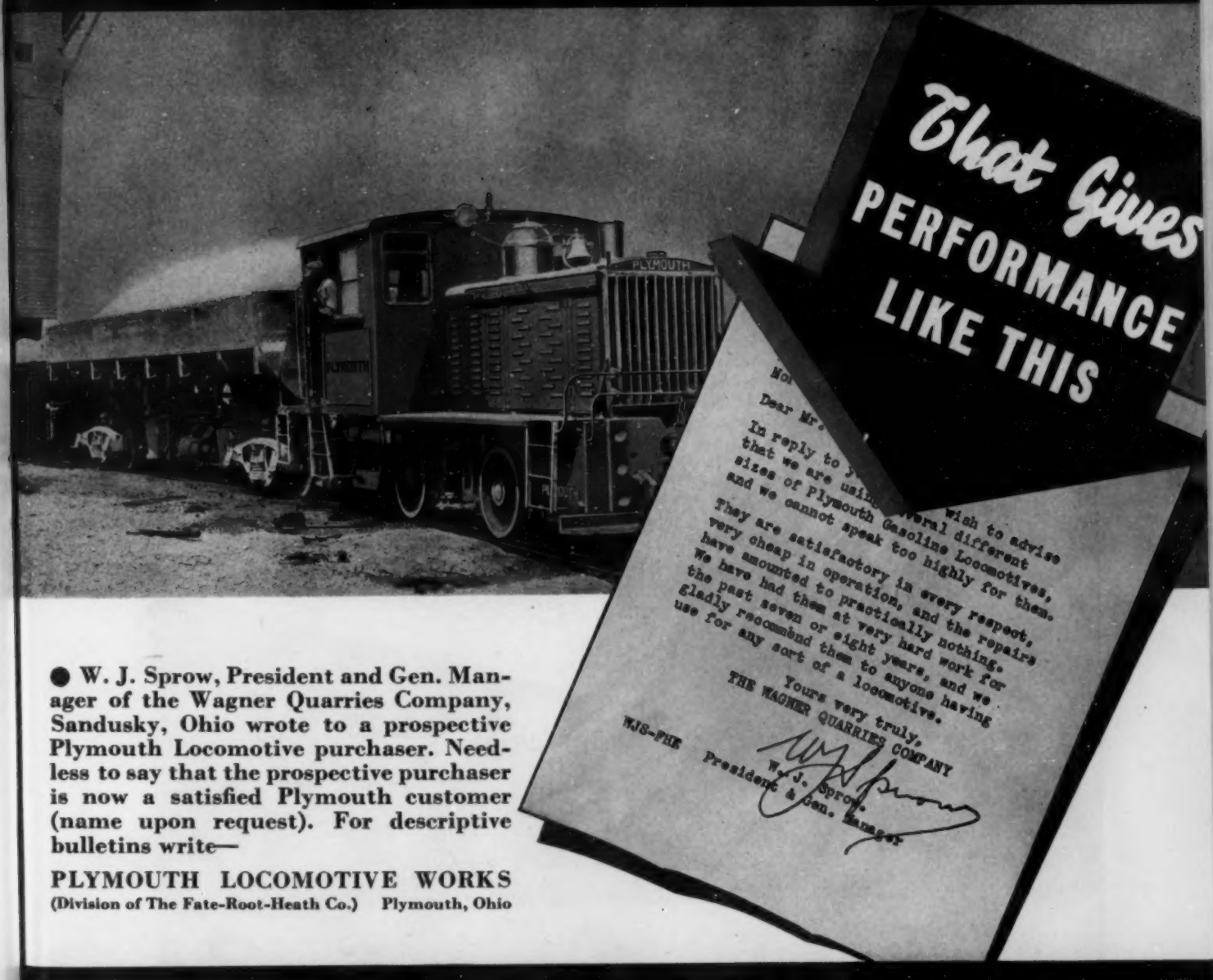
Cleveland, Chicago and New York

COLUMBIA STEEL COMPANY, *San Francisco*

United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

IT'S A *Top Value* PLYMOUTH—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PERFORMANCE
LIKE THIS
PLYMOUTH
Dear Mr.
In reply to y
that we are usi
sizes of Plymouth Gasoline Locomotives,
and we cannot speak too highly for them.
They are satisfactory in every respect,
very cheap in operation, and the repairs
have amounted to practically nothing.
We have had them at very hard work for
the past seven or eight years, and we
gladly recommend them to anyone having
use for any sort of a locomotive.
Yours very truly,
THE WAGNER QUARRIES COMPANY
WJS-PHE
W. J. Sprow,
President & Gen. Manager

● **W. J. Sprow, President and Gen. Manager of the Wagner Quarries Company, Sandusky, Ohio wrote to a prospective Plymouth Locomotive purchaser. Needless to say that the prospective purchaser is now a satisfied Plymouth customer (name upon request). For descriptive bulletins write—**

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(Division of The Fate-Root-Heath Co.) Plymouth, Ohio

TRACK HAULAGE *is cheaper with* PLYMOUTH

GASOLINE • DIESEL • BUTANE • PROPANE
INDUSTRIAL LOCOMOTIVES

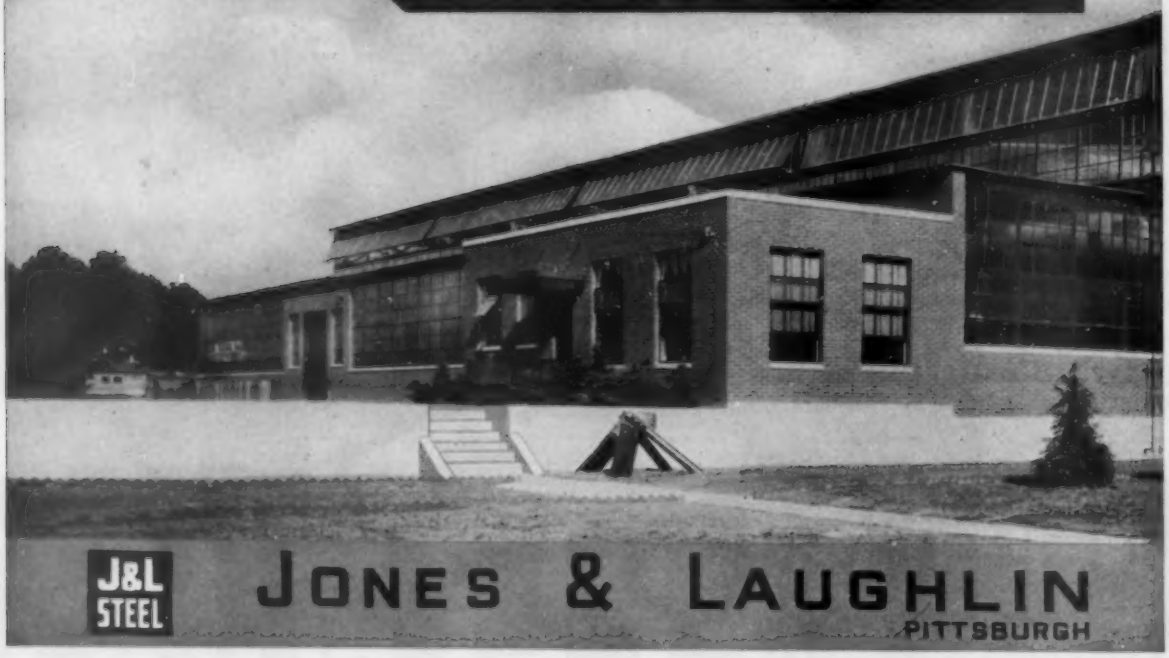
Announcing

The Most Modern WIRE

ROBERT GILMORE

Jones & Laughlin Steel Corporation now announce to the trade the completion of their newest unit, the Gilmore Wire Rope Division at Muncy, Pennsylvania. It is in full operation.

The requirements of American Industry for greater wire rope precision on the larger and more efficient operating equipment has been so insistent in the past decade that it has been a vital problem for present day wire rope making machinery to efficiently meet these demands—not that engineering science had failed to keep apace (in blue print form) with machines capable of meeting the needs of today and tomorrow, but because of the financial obligation entailed in supplanting expensive machinery that does the work . . . in a way. Hence the erection of this large Gilmore unit, an entirely new J & L enterprise.



J&L STEEL

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ROPE PLANT *In the World*

in which there has been brought into action these precision machines, the very latest creation of engineering science.

Our reputation for developing fine rods from which rope wire is drawn, to its present high state of perfection, now enables the Gilmore unit to carry this recognized science to the completion of a better wire rope.

With this machinery we expect to improve wire rope building to such a high state of precision as to be far beyond industry's present needs. Precision ropes from 1/16" to 4½" in diameter—closing machines which are among the largest in the world. Precision in wire sizes and lays with a tolerance as close as 1/1000 of an inch—mechanical control over operations which have heretofore depended wholly upon manual operation—speed so great and accuracy so perfect as to seem incredible—exacting control of steel from our mines to the finished rope.

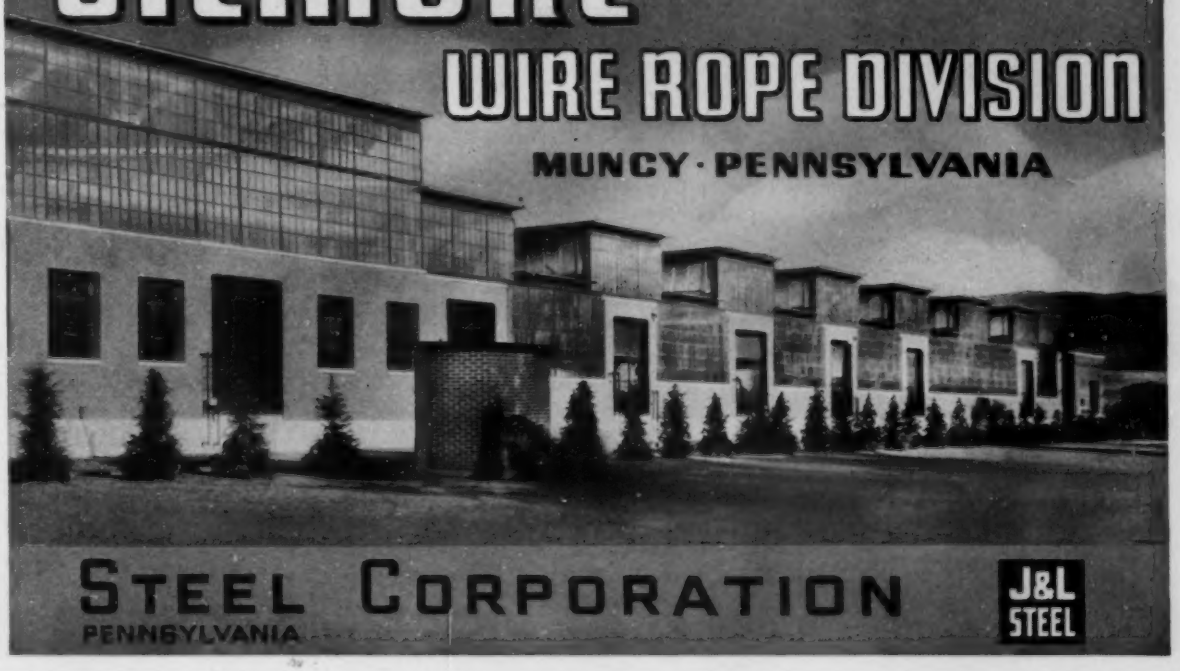
A personnel of skilled wire rope men of long, intensive training, under the direction of Robert Gilmore, General Manager of the plant, one of the few outstanding recognized authorities in the manufacture of and improvements in wire rope making—a man who has contributed much to the industry.

Jones & Laughlin Steel Corporation now offers to you the facilities of this modern plant to more perfectly serve your wire rope needs, with confidence that the use of Gilmore Wire Rope will be more profitable to you through the longer and more uniform service it should render. Write for our catalog now on the press.

GILMORE

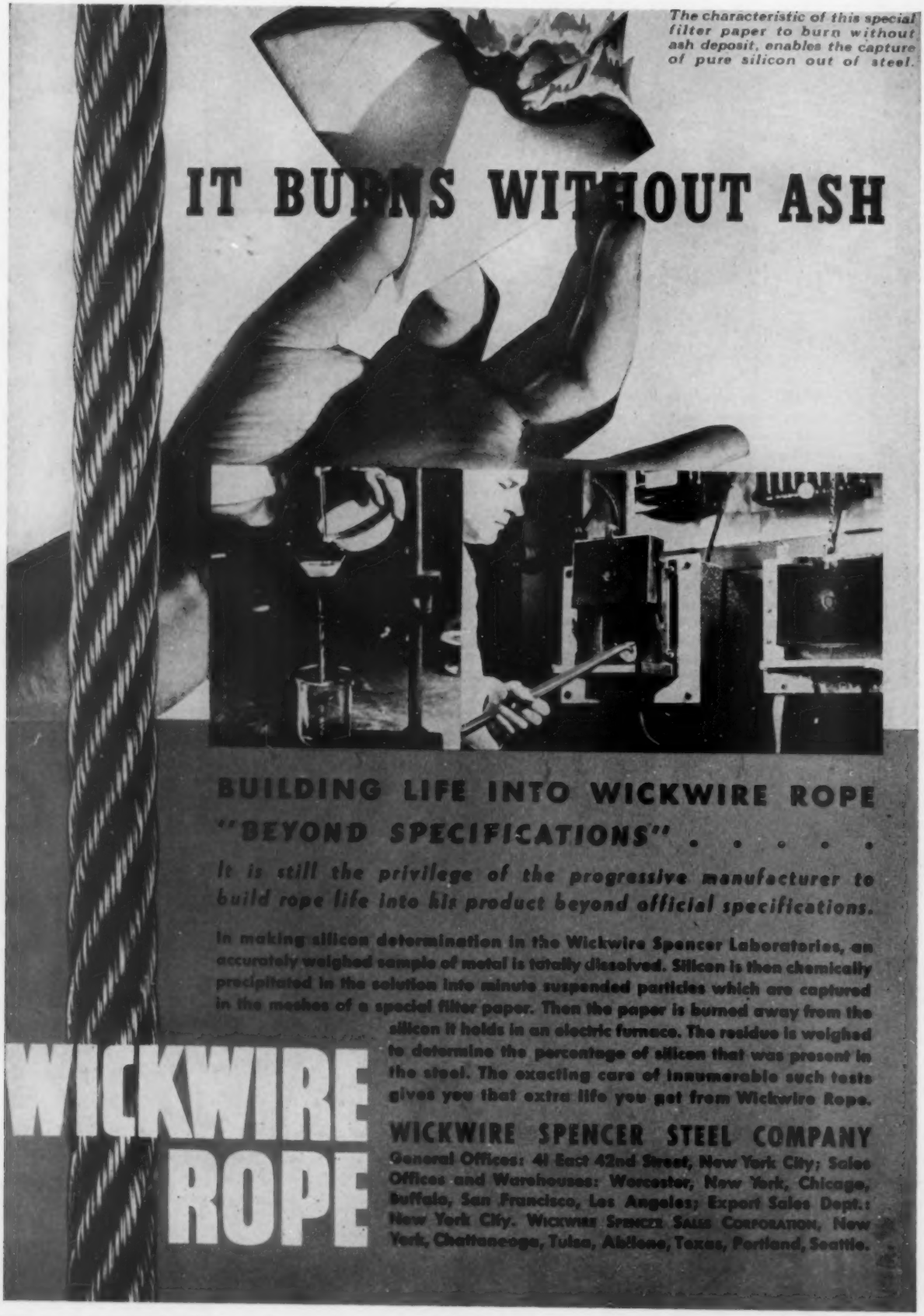
WIRE ROPE DIVISION

MUNCY · PENNSYLVANIA



STEEL CORPORATION
PENNSYLVANIA

J&L STEEL



The characteristic of this special filter paper to burn without ash deposit, enables the capture of pure silicon out of steel.

IT BURNS WITHOUT ASH

BUILDING LIFE INTO WICKWIRE ROPE "BEYOND SPECIFICATIONS" . . . . .

It is still the privilege of the progressive manufacturer to build rope life into his product beyond official specifications.

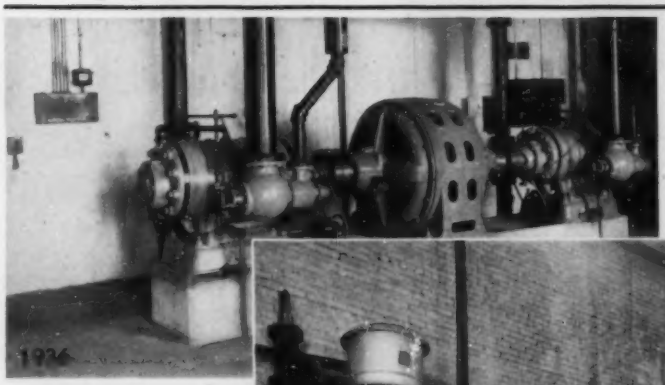
In making silicon determination in the Wickwire Spencer Laboratories, an accurately weighed sample of metal is totally dissolved. Silicon is then chemically precipitated in the solution into minute suspended particles which are captured in the meshes of a special filter paper. Then the paper is burned away from the silicon it holds in an electric furnace. The residue is weighed to determine the percentage of silicon that was present in the steel. The exacting care of innumerable such tests gives you that extra life you get from Wickwire Rope.

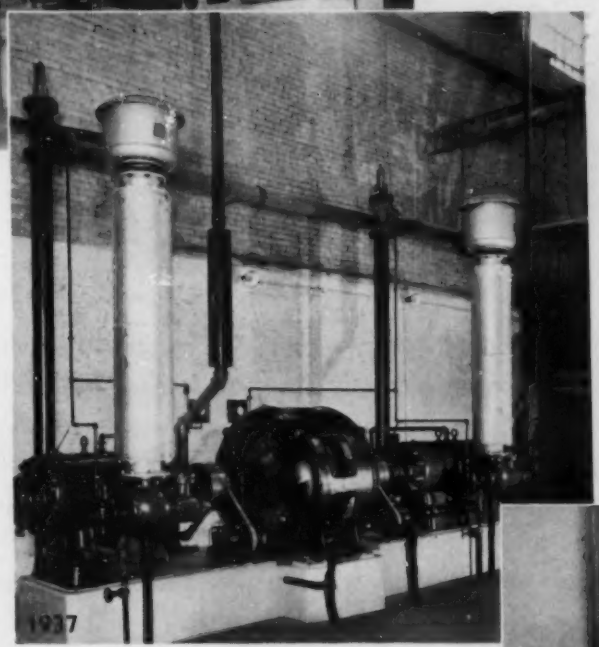
WICKWIRE ROPE

WICKWIRE SPENCER STEEL COMPANY

General Offices: 41 East 42nd Street, New York City; Sales Offices and Warehouses: Worcester, New York, Chicago, Buffalo, San Francisco, Los Angeles; Export Sales Dept.: New York City. Wickwire Spencer Sales Corporation, New York, Chattanooga, Tulsa, Abilene, Texas, Portland, Seattle.

REPEAT ORDERS—THE RULE





AT
NAZARETH
CEMENT
COMPANY

1936 The Nazareth Cement Company, Nazareth, Pa., purchased their first Fuller Rotary Compressors.

1937 So satisfactory was their experience with this initial installation, both as to operation and savings, that when additional air capacity was required they naturally selected Fuller Rotaries.

1938 Again, for a third time, they purchased a Fuller, which was installed in the Spring of this year.

Once more the statement holds true: Repeat orders are the rule; once a Fuller is installed others generally follow.

FULLER COMPANY
CATASAUQUA, PENNSYLVANIA
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C-34

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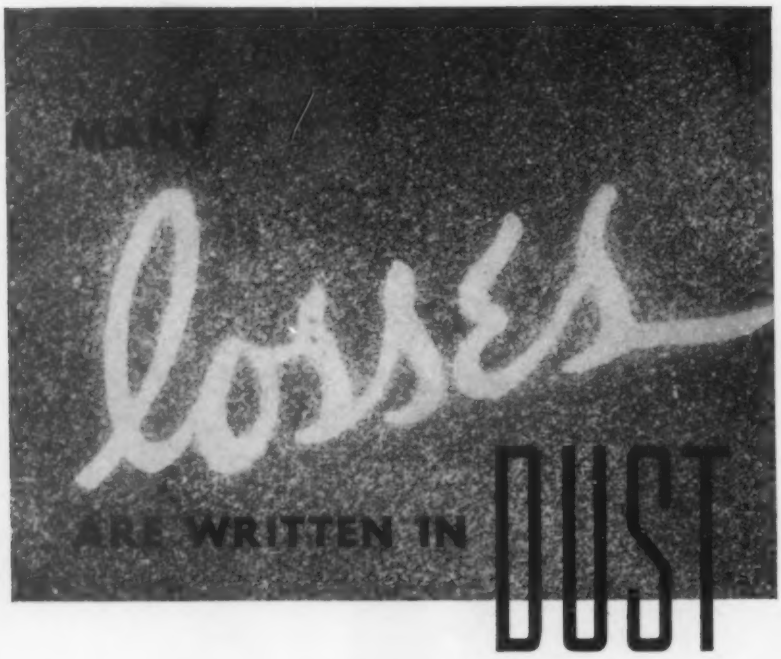


IN THE PROCESSING of cement and other rock products, dust is inevitably created. If that dust is not collected, or if it is inefficiently collected, some of the profits of production escape with it.

To meet the rapidly growing demand for dust collectors many systems and devices have been put on the market. Among these, the cyclone type has demonstrated very definite advantages—most conspicuously so in Buell Dust Collectors.

Employing the Van Tongeren system, with unique, patented features of design and operation, Buell Collectors bring you much higher efficiency than any ordinary cyclone collector. That efficiency is *pre*determined in the Buell testing laboratory and specifically guaranteed for *your* installation.

Buell Collectors cost almost nothing to operate and maintain. They quickly repay the very moderate outlay for installation.

For a clear, practical presentation of the essentials of industrial dust collection, write for our new *Bulletin D81*—free to any managing executive or operating engineer.

If you are interested in fly ash correction ask us to send *Booklet A80*

BUELL ENGINEERING COMPANY INC
SUITE 5000, 2 CEDAR STREET, NEW YORK

buell
DUST COLLECTORS

SALES OFFICES IN PRINCIPAL CITIES

OCT 21 1938

Rock Products

Vol. 41 Chicago, September, 1938 No. 9

Pay, Prices, Profits, Prosperity?

As nearly as one can see through inconsistencies, the New Dealers really do aim to bring about employment and abundance—which is "prosperity." Reduced to simplest, discernable elements their program is (1) high pay (wages), (2) low prices, (3) little or no profits to be retained by producers.

High wages are generally conceded to be good for society. They are good if they are paid in a stable medium of exchange that will buy more of the world's goods than the recipients were able to buy with their previous wages.

However, *high prices* inevitably accompany high wages *until* ways are found to reduce costs by more efficient use of high-priced labor. More efficient use means either one of two things (1) greater voluntary output per individual laborer, or (2) fewer laborers for the same or greater output. Both are accomplished by supplying labor with more and better tools, or instruments of production.

New Deal thinking is faulty in believing that mere increase in volume of production will decrease unit prices. That is true only when an industry is operating inefficiently at reduced capacity. If industry absorbs an influx of new high-priced labor to increase volume, there is no gain in lower costs from larger volume. That happens when industry goes on shorter work days and weeks "to spread employment." As industry absorbs this labor, probably eventually, through pressure of competition, it will devise ways and means to increase output per man, but by that time, probably, there will also be new demands for still higher wages—so the producer always has a hard time reducing costs, and hence reducing prices. It is the ascending spiral that always ends in a panic. Under these conditions rising prices and rising wages only serve to obscure the real objective which is *more goods in exchange for one's labor.*

New Deal thinking is faulty in believing lower prices and higher wages can come without profits. Labor can be made more productive only by furnishing it with more and better tools. These tools represent investment of thousands of dollars per man employed. All economists agree that the *only* source of investment capital is savings —the savings over and above the cost of doing business, or the savings of individuals over and above the cost of living. When New Dealers condemn profits (which are savings) or advocate taking them away by taxation, producers are denied the necessary means of lowering costs and hence lowering prices.

If the New Dealers are the least bit logical, they must eventually see the necessity of stabilizing wages for at least a trial period. Otherwise no one will ever be able to determine whether or not we are increasing and distributing our real wealth. It should soon be obvious that merely passing out more dollars is not increasing buying power or aiding in wealth distribution. They have placed a "floor" under wage levels as a minimum. Inevitably they must place a "ceiling" over wage increases. Otherwise we shall be like the dog chasing his own tail.

It seems to us that employers for purely selfish reasons have no reason to oppose *minimum* wage laws, because they establish a precedent that will inevitably lead to the establishment of maximum wages also. For this same reason labor should be opposed to all wage-fixing laws. It is logical for all of us who still believe in the retention of individual liberties to oppose the wage-hour laws, because they violate one of the longest established principles of the unwritten common law—that every man is a free agent to dispose of his talents, time or brawn as he best can. However, conditions have perhaps denied economic freedom to a majority.

Collective bargaining is advocated by people who are sincere because they believe it offers labor a way to recover some of its lost economic freedom. Obviously, labor will not do so if it merely transfers its lost economic freedom, or slavery, from employers to union dictators or to government dictators. Employers who wish to retain their own economic freedom should assist their employes to retain theirs.

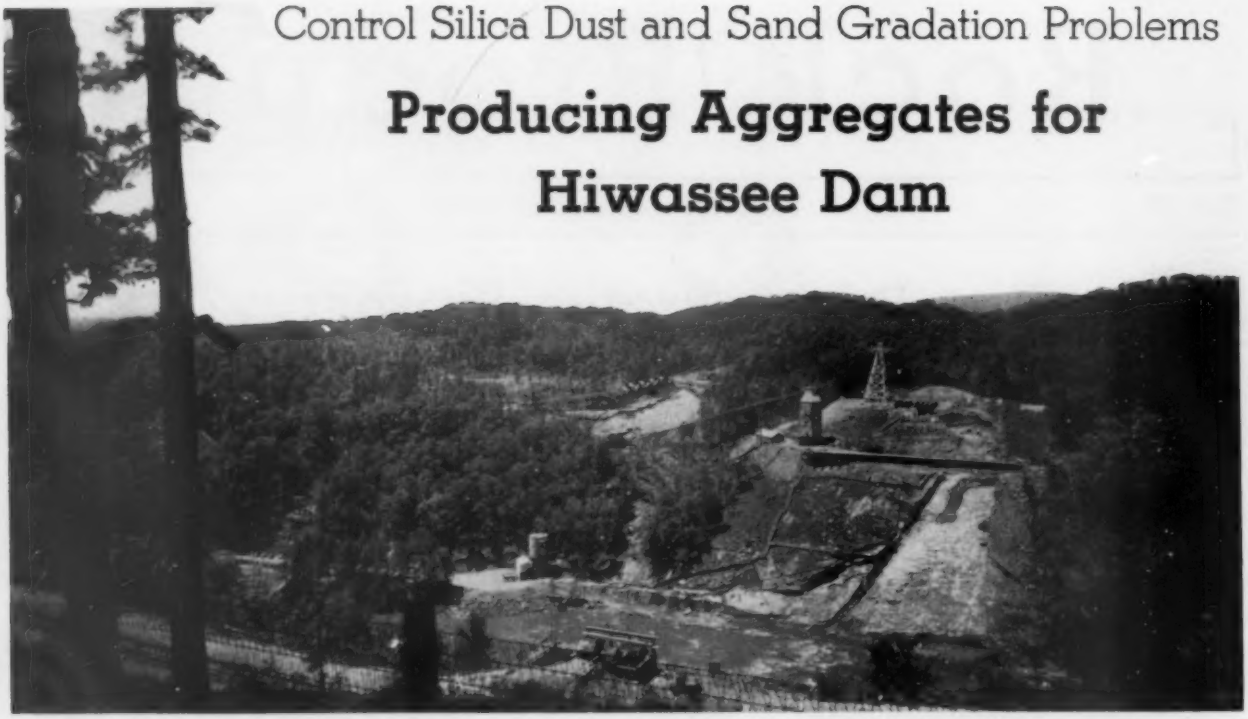
Economic freedom in the case of an individual is partly a state of mind and partly a state of finance. The state of mind is attained by establishment of self-respect and self-reliance and banishment of fear. The state of finance is attained by steady employment and a reasonable measure of thrift—ownership of homes or of stock in the employer's enterprise, money in a savings bank, or life insurance. All this the employer can promote and encourage.

No one who reads current history can doubt we are passing through a truly critical period—there have been similar periods in the world's history (bloody ones)—because large numbers of people have lost individual economic independence. Most thinking men, so far as we can observe, have little sympathy for the methods now being employed to meet this crisis and they are generally doubtful of the sincerity of motives; yet none of us can afford to doubt the seriousness and closeness of the issue or the necessity of meeting it with open minds.

Nathan C. Rockwood

Control Silica Dust and Sand Gradation Problems

Producing Aggregates for Hiwassee Dam



General view of the damsite, showing the concrete mixing plant across the river and to left, the crushed stone stock piles

By STAFF EDITOR

CONSTRUCTION has been started by the Tennessee Valley Authority on one of its largest projects, the Hiwassee dam. This large concrete structure is among the series which were planned with the formation of the T.V.A. in June, 1933. The dam, which will require from two to three years to build, is to span the Hiawassee river, a tributary of the Tennessee, and is located in the Blue Ridge mountains 22 miles west of Murphy, N. C.

As was the case in the construction of Norris dam and Chickamauga dam, U. S. engineers have designed a large capacity plant for the production of crushed stone aggregate and stone sand. Capacity of the new plant is conservatively put at 325 tons of stone per hour, although it has a maximum hourly output of 400 tons. Demands for concrete call for an average production of 4000 tons daily, with a peak of 5000 tons. Crushed stone production began on March 1, 1938, and will continue for two and one-half years.

It is only natural that the U. S. engineers profited by their experience with the two previous T.V.A. stone plants. While about one-half of the equipment has been taken from other plants, considerable rearrangement has been made in the plant layout to make it more efficient than its predecessors and to meet new conditions at the dam site.

Dust Control in Every Operation

One of the most interesting features of the entire plant layout is the matter of dust control. This marks the first time that the T.V.A. has worked in siliceous rock. Being the leader in the current national movement to control harmful dusts and to better working conditions, the government, through its engineers, has spared no efforts to control dust and has brought the dust count well within the limits which are generally considered safe. The latest and most modern dust collecting equipment has been installed in the crushing and screening plant and at the primary crusher. In the quarry, wet drilling has eliminated dust, and water is added at other points where dust is generated.

Stone from the primary crusher enters the secondary crushing and screening plant over conveyor on upper right. Conveyor on lower right returns re-crushed material to the incoming conveyor for re-circulation. On the extreme left is conveyor "D" and the dust collector

The rock deposit, which is being worked into a mountainside, is the familiar Graywacke, a dark gray stone containing 65 percent quartz and some mica and feldspar. It is only the "free silica" that is important as a silicosis hazard. Chemically combined silica in the mica and feldspar does not add to the hazard.

In discussing dust control measures, the plant may be considered as comprising the quarry, the primary crushing plant, the secondary crushing and screening equipment, the sizing screens and storage, and the stone sand classifying plant, in that order.

In the quarry, all drilling is done with the introduction of water directly into the drill holes, both with the well drills for primary breaking and for secondary drilling with jackhammers. As

an added precaution, workmen stationed in the quarry for any length of time are required to wear respirators.

Other places where dust is generated are at the primary crusher, at the unloading point into the crusher and also where the crusher discharges to a belt conveyor. As rock is being dumped into the crusher, it is given a thorough soaking with water through nozzles spaced at regular intervals on a pipeline extending the full width of the crusher platform. Where the crusher discharges to the belt conveyor carrying rock to storage, it is housed and the dust is pulled through a duct to a Schneible dust collector with a rated capacity of 5000 cu. ft. per minute.

The dust concentration in the 85-ft. primary crusher product reclaiming tunnel is relatively low, due to the fact that the stone is sprayed at the primary crusher. However, this relatively low concentration is further reduced by means of a 6000-cu. ft. per minute American Blower Co. fan, which pulls the air from the open end of the tunnel and through its entire length, discharging through a 20-in. duct beneath the stockpile into the atmosphere at a distant point.

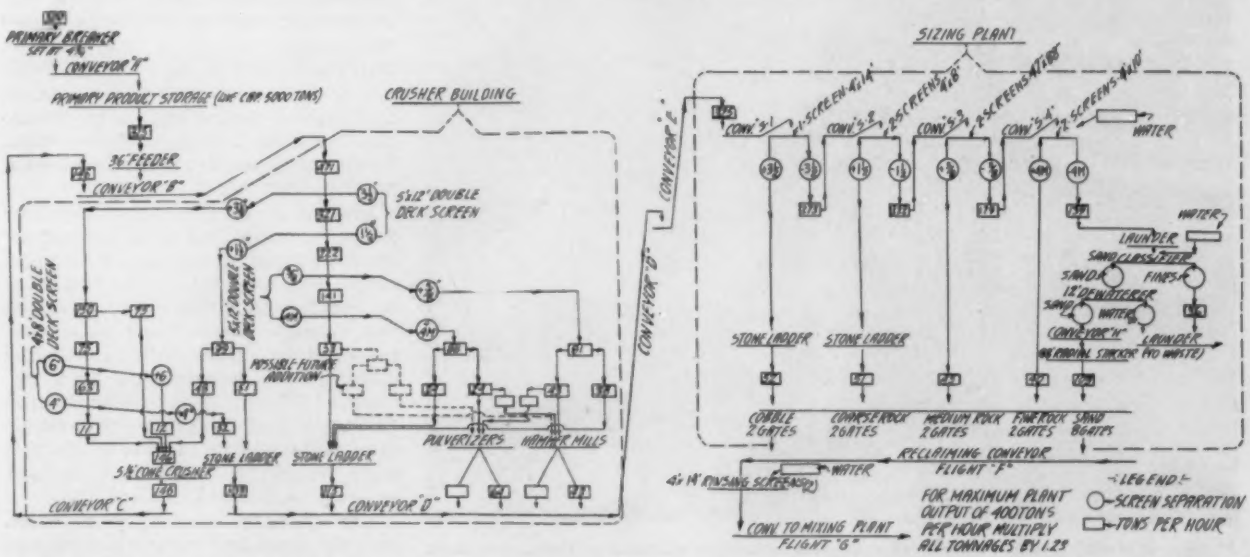
House Screens to Eliminate Dust

The next unit involving a dust problem is the screening and secondary crushing plant, where stone is sized over three screens and considerable crushing takes place through hammer mills. Special precautions are taken here, where stone is dry screened and crushed and the dust concentrations are heavy.

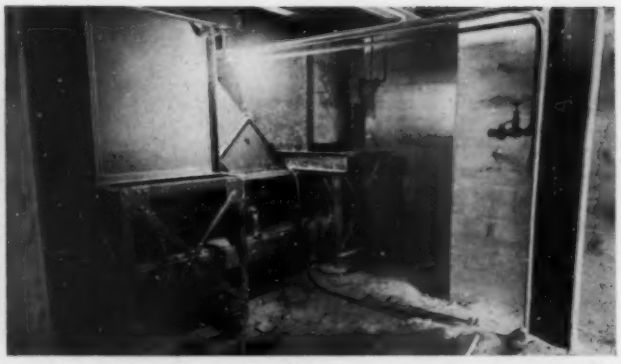
The building is completely closed, and a Clarage fan, rated at 25,000 cu. ft. per minute, and Schneible dust collector have been installed outside. Inside the building the vibrating screens are completely enclosed within a frame "house" and a duct leads to the collector from this enclosure. Dust arising from the belt conveyor discharge above the screens is "pulled" down through the screen room to the collector. At all locations where stone is released to the reclaiming belt conveyor below, for transference to the final sizing screens, ladders are used to break the fall of stone and at these points the conveyor is housed. At this writing the dust counts at all places in the screening and secondary crusher plant where operators are stationed are below 5,000,000 particles per cu. ft., and there is little if any visible dust, even when in full operation.

At other frequent intervals water is added where stone is transported any great distance in the open, and the finished products are dampened down in the open stock piles. As further experience is gained, in all likelihood the dust concentrations will be still further reduced. All workmen are examined and X-rayed every six months as a check

Primary crushing plant with quarry in the background and conveyor to intermediate storage on right. At the foot of the conveyor can be seen the collector which catches dust from the primary crusher



Flow sheet showing operations at the T.V.A.-Hiwassee stone plant. Tonnage figures are based on a conservative estimate of 325 tons per hour



Left: In the secondary crushing and screen house, the sizing screens are enclosed within a tightly boarded housing to confine dust and concentrate it for delivery to a dust collector. On the left is the electrical instrument control board for the plant. Right: A section of the reclaiming belt conveyor "D" in the secondary crushing and screening house, illustrating how it is enclosed and fed by stone ladders

on the efficiency of dust control measures.

Aside from the matter of dust control, the plant differs in many respects from its predecessors at Norris dam and Chickamauga dam. The manufacture of stone sand actually takes place in the screening and secondary crushing plant through the hammer mills, the volume and grading of sand being controlled at this point. At Norris dam the stone sand was made in a separate sand plant beyond the sizing screens and aggregate storage. At the sizing screen the excess of the various sizes below 3 in. were collected on a belt underneath the sizing screens. This belt transferred to a second belt which carried the mixed hammer mill feed to surge bins, from which the hammer mills were fed. Hammer mills were operated in closed circuit with six double-deck vibrating screens. The Norris layout necessitated considerable added handling and the plant was spread over a considerably larger area.

Storage of stone for a three-days' run is provided at the Hiwassee plant, between the primary crusher and the secondary crushing and screening building, in event of a breakdown either in the quarry or at the primary crusher. The earlier plants had no such provisions and operated strictly on a straight-line production basis.

In making stone sand, the type of stone has a decided effect on methods, and the process has been a source of considerable experimentation. Hammer mills are being used for breaking down the stone into sand, in fact the same equipment that produced a satisfactory product at Norris dam is seeing service at Hiwassee. Hammer mills proved very effective in producing a cubical product from dolomite at Norris, making a very workable concrete when used as aggregate and effecting considerable savings in the amount of cement in the concrete mix. This saving in cement more than offset the maintenance costs on hammers.

At Hiwassee, the identical equipment produces a more slabby, sharp and angular particle. This normally would produce a harsh working concrete, but very close control is exercised in its grading. By accurately proportioning the fines and controlling their distribution, engineers claim that the effect of particle shape is minimized. The shape of the particles has made the sand difficult to handle in the classifiers and it has been troublesome to make it feed from open stockpiles to the tunnel belt conveyor below.

At the point of discharge to a belt conveyor, the primary crusher is housed, as shown, with ducts leading to an individual dust collector. Note magnet under roof on right to catch tramp iron

Quarry Operations

In describing the flow of stone from the quarry through the plant to the finished stockpiles, we will start with the quarry which is very close to the primary crushing plant, leaving out reference to the dust control previously mentioned. As it is a new plant in hitherto undeveloped country, the quarry is in the process of development and is being worked into the mountainside with an increasing face height. When fully opened up, the face height will be about 160 ft.

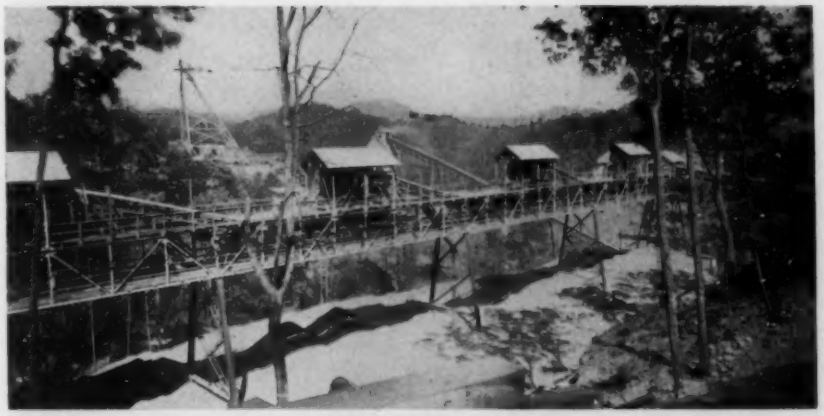
Drilling is done with two Bucyrus-Armstrong blast hole drills and a Keystone well drill at the rate of 3.2 to 3.5 ft. per hr., 9-in. holes being spaced 40 ft. apart, with a burden of 23 ft. at the present time. These drills are mounted on skids. After secondary shooting, two Bucyrus-Erie 3-cu. yd., electric shovels load the stone into 12-cu. yd. Hug trucks (4), which haul an average load of 14 tons to the primary crusher. The crusher platform is at the quarry floor elevation.

The primary breaker is a 42-in. Superior-McCully gyratory crusher, rated at 500 tons per hr. with a 4¾-in.

setting. The output of the crusher, 4¾-in. minus stone, is taken over a 42-in. conveyor belt, 366-ft. centers, to storage over a tunnel for later reclaiming to the secondary crushing and screening plant. Live storage over the 85-ft. tunnel is 3000 tons, with a total storage of 15,000 tons, sufficient for a three-days' run.

If for any reason there is a breakdown in the quarry or primary crushing plant and it is necessary to draw in excess of 3000 tons from this storage pile, a bulldozer will be used to transfer stone from dead storage to live storage.

The only feeder in the entire plant, a 36-in. Jeffrey-Traylor vibrating type, is in the tunnel to feed uniformly 4¾-in. minus stone to a 24-in. conveyor belt, 452-ft. centers, for delivery to the screening and secondary crushing plant. Over this belt conveyor and the one from the primary crusher, Cutler-Hammer magnets have been placed to catch tramp iron.



Finishing screens above the storage piles, which serve a tunnel conveyor below. On the extreme right is the conveyor belt bringing stone from the secondary crushing plant

Center Control Of Stone Sizing

In the secondary crushing plant is centered all the control for stone sizes, from cobbles down to stone sand, and changes are made to conform with what is needed in size proportions in the final stockpiles. Stone sand is actually produced here through hammer mills to the desired sizes, there being considerable flexibility in their operation. The aggregate sizes produced for concrete are cobble stones, coarse rock, medium rock, fine rock and stone sand.

All stone from the reclaiming belt conveyor, 452-ft. centers, is discharged over the first of two 5- x 12-ft. double-deck Allis-Chalmers horizontal, vibrating screens, one set directly over the other. These screens are completely enclosed to confine the dust.

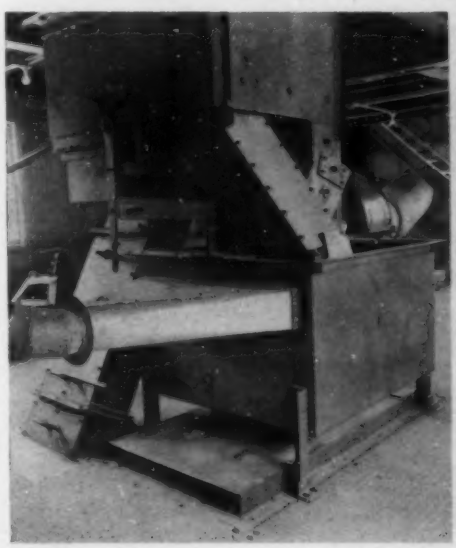
The screening arrangement is designed to increase the average size of the cobbles to improve their grading and to conserve cement in the mass concrete for the dam construction. A separation is made at 3½ in. on the top deck of the first screen over perforated plate with 3¾ in. actual size openings.

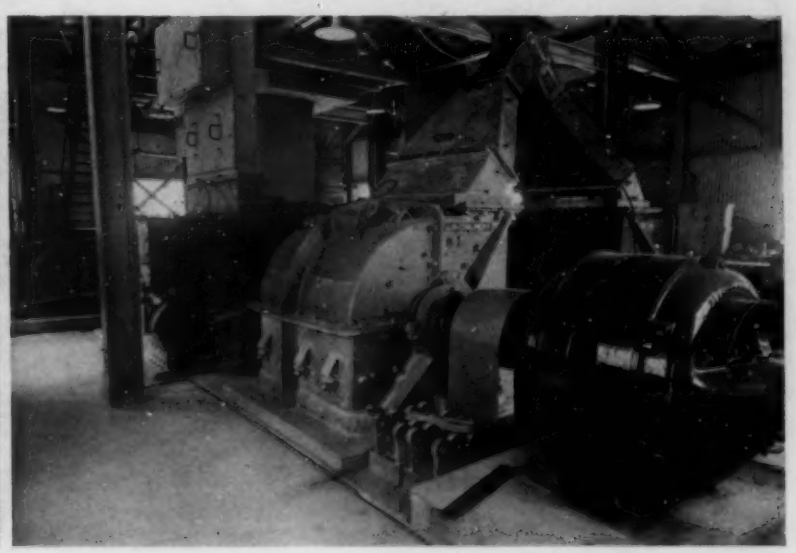
Plus 3½-in. stone coming from the end of the screen goes to a splitter, with one-half of the stone passing directly below to a 5½-ft. Symons standard cone crusher which has a bowl designed for the manufacture of a finer product than that ordinarily put through a standard cone crusher. The cone crusher is set at ¾-in. to produce a product all smaller than 1½-in.

The other half of the oversize from the flat screen top deck, containing cobbles and even larger stone, is put over a 4- x 8-ft. Robins "Gyrex" double-deck vibrating screen with 7¼-in. and 4½-in. openings on the top and bottom decks, making separations at 6 in. and 4 in. respectively. Plus 6-in. stone from the top deck goes to the 5½-ft. cone crusher, along with minus 4-in. stone passing through the lower deck.

It will be noted that the top deck of the upper Allis-Chalmers screen makes a separation at 3½ in. with a 3¾-in. opening. The lower deck of the Robins screen makes a nominal separation at 4 in. with a 4½-in. opening. However, since there is a big excess in the smaller sizes of cobbles as made in the primary crusher, minus 4½-in. plus 3½-in., and since screening on the lower deck of the Robins screen cannot be 100 percent efficient, a sufficient amount of this

Left: One of the many flexible arrangements in the plant to control the handling of material. The one shown diverts the feed to either hammer mill, below, in making stone sand. Duct at left leads to dust collector. Right: Four hammer mills of two types used to manufacture stone sand





Belt conveyor "D" carrying all aggregate from the secondary plant to the finish screening plant. It will be noticed that the conveyor bends in elevation to follow the topography

smaller size cobbles is left in the finished cobbles to close what otherwise would be a gap, if screening were 100 percent efficient. The net result of screening on the lower deck of the Robins screen with the elimination of the undersize, is to increase the average size of the finished cobbles and to improve their grading.

Finished cobbles are put through a stone ladder to reclaiming belt conveyor "D" for transference to the final screening plant and storage.

Next we follow the flow of intermediate stone, beginning again with the first 5- x 12-ft. horizontal screen. Stone passing the top deck but retained on the lower deck (minus 3½-in. plus 1½-in.) is split, with as much as is needed passing directly through a stone ladder to belt conveyor "D".

The rest of the minus 3½-in. plus 1½-in. product goes to the 5½-ft. cone crusher, making the fourth source of feed to this crusher. The output of this crusher is put back on the belt conveyor bringing fresh stone (conveyor B) by belt conveyor (conveyor C) and is re-circulated through the screening plant. All of the secondary crusher product must eventually pass the lower deck of the first horizontal screen (minus 1½-in.) before it is processed further.

By breaking down the extra cobbles an excess is thrown on the lower stone sizes. Minus 1½-in. stone passing the lower deck of the first horizontal screen is fed over a pan to a second 5- x 12-ft. Allis-Chalmers double-deck vibrating screen, with ⅝-in. openings on the top deck and 4-mesh openings below. This screen operates in conjunction with two 42- x 48-in. Pennsylvania hammer mills and two 42- x 48-in. Allis-Chalmers hammer mills (pulverators) in the production of stone sand. Only one of each type hammer mill is operated at one time, the others serving as reserve units for breakdowns or when hammers are being replaced.

Controlling Stone Sand Gradation

These are the same machines that were used so successfully in the early T.V.A. aggregate plants. Control of sand gradation as well as volume is exercised here by switching the feed from the screen to one mill or the other by the use of splitters, in any combination. Plus ⅝-in. stone is generally split, with some of it going direct to conveyor "D" and the excess going to either Pennsylvania hammer mill. Most of this product is converted into sand. Similarly the 4-mesh to ⅝-in. stone is usually split, some going to belt conveyor "D" and the remainder (or all) going to one of the Allis-Chalmers pulverators.

The minus 4-mesh stone passing the lower screen deck is already "sand", a product of crushing through the primary and secondary crushers. Therefore all, or part, can be by-passed the

Above: Swinging stacker for stockpiling stone sand direct from de-waterer. In the background is the final screening plant

Below: Sand recovery plant, showing launder on right from final sizing screen to the classifier. Below the classifier is the washer for de-watering and to the left, sand is being stockpiled

hammer mills to conveyor "D" or any part, or all, can be put through a pulverator. Generally all of this "sand" is put through the pulverator since some of it is slabby and in need of further reduction.

Considerable flexibility is possible in the manufacture of stone sand, by altering the feed to the mills. The amounts fed can be changed to meet volume demands as evidenced in the finished material stockpiles, and there are means to change the product size coming from either mill. For example, ⅝- to 1½-in. stone can be fed to the pulverator or 4-mesh to ⅝-in. stone to the Pennsylvania hammer mill.

Variations in feed have an important bearing on the ultimate product and its gradation, since the hammer mills each produce a different product size. The Pennsylvania mills are slower speed machines than the pulverators, but being Texrope driven, their speed may be increased or decreased, depending on the gradation of product required. Mills are being operated without grate bars, and the process of manufacturing stone sand causes wear to take place on the face sides of the hammers instead of on the back. The splitters throughout this screening and crushing unit are changed to produce the exact amount of each size product in the finished stockpiles, so that there will be no overproduction of either of the five sizes of stone. Production of stone sand will probably average 25 percent of the total plant output, with a peak requirement for 100 tons per hour.

Final Screening Plant

Conveyor "D" receives all the product of the screening and secondary crushing plant, through stone ladders, and transports it to the final screening plant after transferring to conveyor "E". These 24-in. belt conveyors transport all stone a distance of 611 ft., where it is sized over a series of vibrating screens fed by short 24-in. belt conveyors, the screening structure being built at right angles to the feeding belt and over another reclaiming tunnel.

The first screen in the series, a 4- x 14-ft. single-deck Niagara vibrating screen is fed by a conveyor, 43-ft. centers, and the plus 3½-in. stone (cobbles) drops through a stone ladder to storage. Throughs from this screen are carried over a conveyor belt, 81-ft. centers, and split over two 4- x 8-ft. Kennedy single-deck vibrating screens, with the plus 1½-in. product going to storage. Minus 1½-in. stone goes over a belt conveyor, 92-ft. centers, to be split over two 47- x 88-in. Jeffrey-Traylor electrically vibrated screens, with the plus ⅝-in. stone dropping to stockpile. Minus ⅝-in. stone then is

Bull-dozer caving stockpile of stone sand to facilitate reclaiming on tunnel conveyor

carried over a belt conveyor, 91-ft. centers, and put equally over two 4- x 10-ft. Symons horizontal, single-deck screens, where the 4-mesh to ⅝-in. stone drops to storage. Horizontal screens are used here to save head room and because they provide better drainage.

Sand Classification

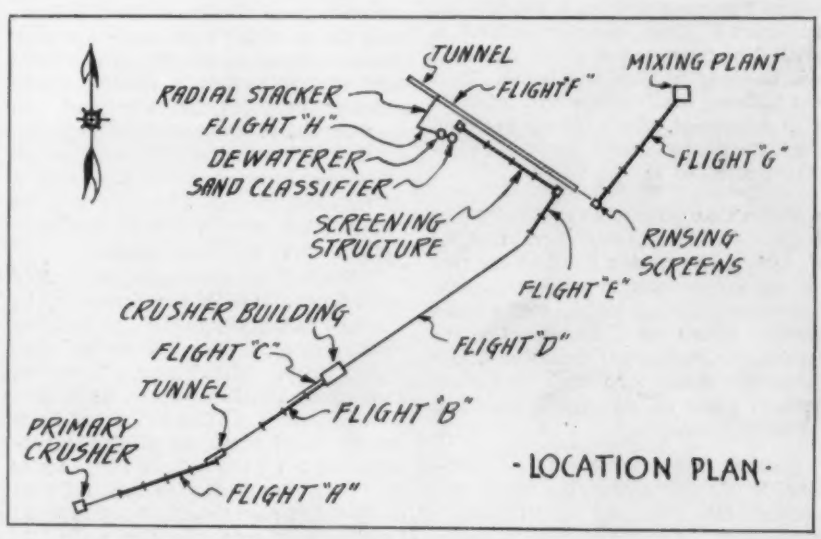
Wash water is applied only over the two 4- x 10-ft. Symons finishing screens. This is done for two reasons. The throughs (minus 4-mesh) are laundered to the sand classification equipment where stone sand is classified and recovered, and the volume of water necessary for the latter operations can easily be controlled and varied in the wash water pipe over the screens. Water is also added at these screens to prevent blinding in the sizing of small products. It will be remembered that when the weather is dry, water is occasionally added to the stone throughout the system to settle dust. In wet weather the stone is already damp, so it is only natural that more water will be added for screening of fine material to get any efficiency.

Minus 4-mesh material and water passing through the Symons screen cloths are flumed to a size 15 Nordberg-Wood Auto-Vortex bowl classifier, where sand is recovered in the proper gradation. The bulk of the water entering the classifier is that from the screen sprays, where it may be varied, but fresh water is also added in the classifier through an annular opening to create better washing action.

The unwashed sand contains about 70 percent minus 100-mesh. The minus 100-mesh is reduced in the classifier to approximately 10 per cent, the excess fines going to waste. The average screen analysis of finished sand follows:

Screen Size	Percentage Retained
4-mesh	2.1
8-mesh	23.6
14-mesh	21.6
28-mesh	16.0
48-mesh	12.9
100-mesh	13.8

Overflow from the classifier is wasted and the recovered product is put through a 12-ft. Dorrco washer for dewatering. Discharge from this machine, containing about 20 percent moisture, is ready for stockpiling over the reclaiming tunnel below the finished storage piles. It is transferred from a 24-in. horizontal belt conveyor, 98-ft. centers, to an 88-ft. Barber-Greene



Location plan of crushed-stone plant erected by T.V.A. to supply aggregates for Hiwassee dam

radial stacker, 24-in. belt, and stockpiled. This completes the description of the plant, with the finished products in place ready for delivery to the concrete mixing plant.

In the reclaiming tunnel beneath the stockpiles, any stone product can be released to the 700-ft. belt conveyor through hand-operated gates. There are two gates for the release of each stone product and eight for sand. Stone is delivered from storage at a signal from the mixing plant. The sand, probably because of the particle shape, has been difficult to feed to the belt, forming a cylindrical cone over the drawoff gates. A 75-hp. Allis-Chalmers tractor bulldozer sees considerable service in caving the sand in stockpile and handling it to increase flow through the gates.

At the discharge end of the reclaiming belt conveyor, all stone is washed over rinsing screens and then transferred to a belt conveyor, 395-ft. centers, which delivers clean stone into the bins of the concrete mixing plant. Rinsing is done on two 4- x 14-ft. Allis-Chalmers low-head vibrating screens, over which the feed is divided.

Screen cloth is perforated plate to accommodate a lot of large stone. Wash water is applied for the first four feet of screen length, and it is drained off for the remaining distance. Openings are 7/32-in. round for the first 7 ft. of screen cloth, followed by 5/32-in. by 5/8-in. slotted openings.

Another interesting feature of the plant is the interlocking electrical control of all equipment. If any machinery in the system should stop, all equipment preceding the affected unit will automatically stop, while the rest of the plant will continue to operate.

THE PORTSMOUTH SAND & GRAVEL CO., Portsmouth, Ohio, recently suffered a small loss from a fire which damaged the building housing the boiler. It is not believed that the fire will interfere with operations. The company has been busy furnishing gravel for the resurfacing of route 73.

HOGAN'S SAND AND GRAVEL CO., Poughkeepsie, N. Y., recently overhauled its washing and crushing plant at the pits on the South road in preparation for the seasonal rush of business. The plant recently passed the State inspection requirements. Principal business is in sand, but some trap rock from the Stoneco plant of the New York Trap Rock Co. is sold.

HUGH G. WILLIAMS SLATE CO., Granville, N. Y., closed down its plant employing 100 men for an indefinite period until demand for slate again picks up.

Specializing In Portland Cement and Aggregates

By GEORGE D. ROALFE
Contributing Editor, West Coast Activities

IN MAY, 1937, J. Allen Cassidy and J. Paul Cook formed a partnership to engage in the sale of portland cement and concrete aggregates. Both had been in the material business for a number of years principally in sales activities.

Bunker for storing aggregates at plant No. 2 has ingenious device for controlling bins from the ground

Having come to the conclusion that the oil industry had peculiar problems with regard to these construction materials, they decided to specialize.

A site for the new enterprise was obtained from the Union Pacific Railroad Co. on Henry Ford Boulevard near Anaheim Street in the Wilmington District of Los Angeles, a location which provides excellent highway and rail transportation. Original buildings consisted of a corrugated iron combination office and cement warehouse and a garage, but the rapid increase in sales required the construction of an additional cement shed and garage.

Concrete finds many uses in oil field development and in the refineries. In the area contiguous to the Los Angeles-Long Beach Harbor District are the Signal Hill, Wilmington, Torrance, Dominguez and Long Beach Oil Fields. Two of these, the Wilmington and Long Beach, are located on tidelands surrounding the harbor. Both Los Angeles and Long Beach require that all production and storage tanks be surrounded by reinforced concrete fire walls. To date several hundred have been built. The rig itself is supported on a concrete mat which, in soft ground, is supported by piling.

One year after entering business Cassidy & Cook celebrated the opening of a second plant. This is located on the northerly edge of the Signal Hill Oil Field and adjoining the Long Beach Municipal Airport. The illustration clearly shows the red clearance light at the top as a warning to airplanes. At this plant is located a 400-ton bunker. It contains three hopper-bottom, self-cleaning compartments. The three gates are drawn to the center, and are framed to accommodate a weighing batcher which will be installed in the future.

Materials are all received by truck transportation and are delivered into the steel-lined timber truck hopper. The bucket elevator boot is concrete lined and floored. The bucket elevator, with a capacity of 40 tons an hour, is driven by an electric motor, with V-belt reduction drive.

An ingenious device permits the bunker man to select the bin from the ground to receive the material. Material being elevated is discharged at the elevator head into a single chute fitted with a piece of large diameter rubber hose. The discharge end of this hose can be swung to register with any of the three distribution chutes. A light wire cable actuates the moving mechanism. At the lower end, the cable has a ring which can be made to slip over any one of three pins in a bunker post. This bunker was designed to resist a lateral or seismic force of .08 G when fully loaded and conforms to the local earthquake resistant building requirements.

At this location Cassidy & Cook also have a truck scale and office building. All aggregate supplies are obtained from commercial producers, crushed rock and gravel originating in Orange County or San Gabriel Valley plants, and sand from Orange County or Lomita. The storage provided by the bunkers has proved to be economical and has greatly aided servicing. Ordinarily, full loads of material are delivered direct to the job from the producing plant, but for peak requirements or short loads bunker storage is used. The nearest commercial rock and gravel production is approximately 30 miles away.

Raw Material Emphasized in Reclamation Bureau

CONCRETE CONTROL

By JACK HAVARD*
Mining Engineer, Denver, Colo.

"GOOD UNIFORM CONCRETE" is a well-worn phrase to engineers of the U. S. Bureau of Reclamation who are supervising the development of great projects throughout the West. But "good" is being replaced by "excellent" as the Bureau's field and laboratory men set increasingly higher standards through use of better aggregates, more suitable cement and superior workmanship. In fact, much of the up-to-date knowledge of concrete is due to work accomplished by the Bureau.

The range and magnitude of Bureau of Reclamation projects have focused the attention of technical men in every field of engineering. Boulder dam, Grand Coulee dam, Parker dam, the All-American Canal — these are outstanding examples of current projects in the largest construction program in the history of federal reclamation, a program which spreads from California to the Dakotas and from Washington to Texas. Hub of all the work is the chief engineer's office in the Customhouse in Denver, where the designing offices and the laboratories are located.

The design and research work of the Bureau of Reclamation are under the direction of J. L. Savage, chief designing engineer, and engineering and construction are directed by R. F. Walter, chief engineer. All Bureau activities are supervised by John C. Page, commissioner of reclamation, with administrative offices in Washington, D. C.

The Division of Materials, Testing and Control, under the supervision of Arthur Ruettgers, senior engineer, and R. F. Blanks, engineer, is divided into a number of units for the effective distribution of effort. These are: Concrete and Metals, Cement and Paint, Earth Materials, Hydraulic Structures, Pumps and Turbines, Equipment and Supplies, and Specifications and Reports. Most intimately coöperative of these units are of course, Concrete and Metals, under the direction of E. N. Vidal, engineer, and Cement and Paint, supervised by H. S. Meissner, engineer.

The concrete and cement laboratories, with which this article is chiefly concerned, occupy about half the basement of the large Customhouse in Denver. A staff of 17 engineers, two inspectors, three mechanics and five laborers is occupied with concrete and metals testing, and a similar group is busy with cement and paint.

Aims of Bureau Concrete Control

From the inception of a project, the concrete and cement laboratories are alert to be of assistance. Their initial job may be an investigation of the properties of a material for the information of the designing engineers. More often these laboratories are first active in a study of aggregate deposits, either commercial or unexploited, in the vicinity of the proposed structure. The proper type of cement must be selected and thoroughly tested. Then, using the basic raw materials which will be available on the job, and taking into account the peculiarities of the structure itself, be it dam, tunnel lining or powerhouse, the laboratories make a series of trial concrete mixes, which are subjected to a wide range of tests that closely simulate field conditions. Finally field standards are established for the job, and all pertinent information is forwarded to the project office for guidance in controlling construction operations during the progress of the work. Inspection is maintained constantly during construction and continued intermittently long after the project is completed.

Establishing Field Standards

Preliminary examinations of the surficial geology of the region surrounding a proposed reclamation structure result in certain areas being selected for sampling of possible aggregate deposits. In addition to tests made in the field, samples are sent with data to the Denver laboratories for further analysis. The laboratory engineers make tests to determine grading, specific gravity, silt content and organic impurities. Special

Fig. 2: Apparatus for making permeability tests on concrete under controlled 70 deg. F. temperature. Hydrostatic pressures as high as 500 p.s.i. are attained. Fig. 3: Apparatus for the regulation and recording of conditions in the calorimeter rooms, where specimens are cured under adiabatic conditions

FIG. 2

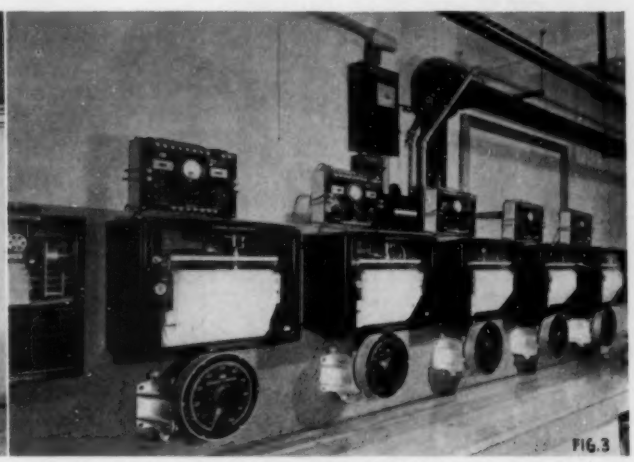


FIG. 3

investigations may be necessary on such characteristics as resistance to abrasion, toughness, shale content and organic impurities. Soundness, as measured by resistance to sodium sulfate tests, freezing and thawing, and wetting and drying, is always determined. One of the engineers is an expert petrographer who may be called for microscopic analyses. An ideal aggregate is, of course, never found, and in difficult cases various processing means may be used to improve the materials—for instance, at Grand Coulee the sand is classified into three sizes, and then these sizes recombined in different proportions to provide improved sand grading.

The water to be used must also be investigated, extra precautions being taken in arid regions where it is likely to contain large quantities of dissolved salts. The Bureau specifies that "water for mixing concrete shall be reasonably clean and free from objectionable quantities of silt, organic matter, alkali, salts and other impurities."

The cement is specified by the Cement and Paint division after careful consideration of its adaptation to the structure planned — that is, whether low-heat, modified, sulfate-resisting, standard, portland-pozzolan or high-early-strength cement has the required characteristics. The choice will depend chiefly on three factors: design conditions (type and methods of construction, prevailing weather, rate of construction), service conditions (exposure to the elements, moisture or chemical attack), and available raw materials and manufacturing facilities in the region.

Modified portland cement is replacing standard portland cement in most Bureau work. The progress of portland-pozzolan cements, which are showing desirable qualities in laboratory tests and in actual construction by other organizations, is being followed with interest by the Reclamation Bureau. Before cement is accepted by the Bureau it is sampled and tested (by the National Bureau of Standards) according to methods which are explained in the specifications, so Bureau field inspectors need not be concerned with quality, except as affected by shipping, storage and utilization.

The preparation and testing of trial mixes is accomplished with unusual care, for here the materials of the concrete receive their most crucial trial in the laboratories. For each maximum size of aggregate, the engineers investigate a variety of cement contents, gravel-to-sand ratios and slumps, not only to determine the most suitable mix for a given aggregate, but also to obtain information which might be useful to the field men in making any changes necessary on the job. A number of specimens are cast from each mix, the cylinder size depending upon the maximum size of the aggregate.

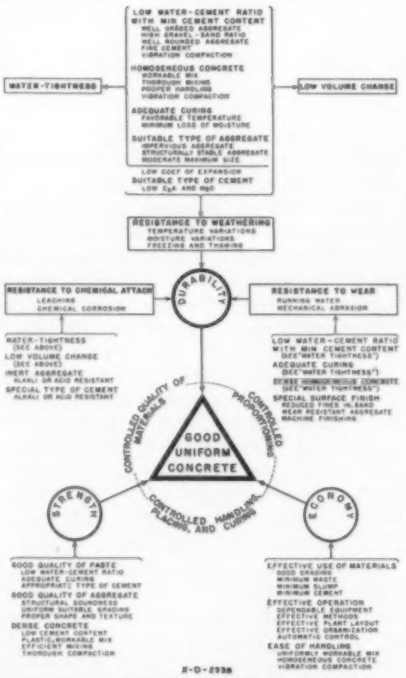


FIGURE 1—FACTORS AFFECTING THE PRODUCTION OF GOOD, UNIFORM CONCRETE

Diagram prepared by the Reclamation Bureau to show factors affecting the production of good, uniform concrete

As routine, the specimens are stored in fog rooms for 28 days and then, after capping, tested for strength and elastic properties. Many special tests are also made at Denver, the possible variety of which is indicated by the unusual equipment available (partly listed later in this article).

Inspection

Coöperation is the keynote to the success of the Denver concrete and cement laboratories—coöperation with the designing engineers, the field engineers and inspectors, and the contractors. Bureau inspectors on the job are responsible for seeing that the contractors achieve the intent of the specifications. They are instructed to be courteous and diplomatic in their relationship with the contractors, but to be systematic and accurate in their sampling and testing. A regular series of reports keeps the Denver office posted on developments in the field. Further experimentation and changing of the standard mixes is sometimes necessary as job conditions vary. Laboratory men are often sent into the field to assist in the solution of special construction problems.

Field concrete-control crews, duties and facilities are adjusted, of course, to the size of the job, but in the case of such large projects as Grand Coulee the field force may consist of several hundred men, with a fully equipped laboratory.

Research Activities

The Denver laboratories have found that concrete control is inseparable from concrete research. The search for better methods of making and applying concrete is endless, so there are always several laboratory engineers following some special problem that leads away from the routine into the unknown. Often the apparatus for such tests is non-existent and must be constructed in the Bureau's shops.

Some of the major and minor research problems now being studied are:

(1) Aggregate studies—effect of sand grading; effect of percentage of crushed particles in natural gravel on cement requirements; development of apparatus for field determination of moisture in aggregate; durability of aggregate.

(2) Cement and admixtures—premature stiffening in portland cement; effect of particle-size distribution on properties of portland cement; properties of portland-pozzolan cements; pozzolanic activity; resistance of cement to sulfate attack; effect of admixtures on durability and shrinkage of concrete; durability of cements; effect of glass on cement properties.

(3) Mixing and placing — design of concrete mixes; effect of cement fineness on bleeding of concrete; effect of extending mixing on initial settlement.

(4) Curing and aging—effect of casting in tin cans as compared with cast-iron molds; effect of curing on resistance to freezing and thawing; concrete curing compounds.

(5) Elastic and plastic studies— extensibility or crack resistance of concrete as affected by type of cement.

(6) Volume changes — shrinkage of gunite; volume change of concrete on mass curing; volume change due to wetting and drying.

(7) Durability and permeability—relation of porosity, absorption and related properties to permeability and durability; resistance to wear in abrasion tests by silt-laden water; durability of concrete; effect of size of aggregate on permeability of concrete.

(8) Miscellaneous studies — type of clean-up for construction joints; nailing concrete; concrete core drilling.

(9) Reinforced concrete.

It is impossible to list here the detailed accomplishments of the Bureau in advancing the art of applying concrete to structures. The Denver labora-

tories may claim a large share of credit for such achievements of the Reclamation Bureau as the following:

Developing a satisfactory working specification for low-heat cement which, in combination with artificial cooling, has been declared the greatest single factor contributing to the successful completion of the Boulder Dam project.

Establishing the comparative physical and chemical properties of five distinct types of portland cements, thus permitting more intelligent and efficient selection of the proper type of cement for specific jobs. Originating specifications of the so-called modified or moderate-heat type of portland cement, which gives promise, the Bureau believes, of becoming the all-purpose cement for general use because it exhibits qualities superior to those of the present standard cement.

Establishing the thermal properties of mass concrete and proving that such properties as established in the laboratory may be used for accurate prediction of temperature variations and movements under field conditions. Evaluating the effects on various properties of mass concrete of such variable factors as size of test specimen, size of aggregate and wet screening.

Developing methods for testing the permeability of mass concrete under high heads, resulting in a better understanding and clearer conception of the structure of concrete and its suitability to hydraulic structures.

Applying the accelerated weathering tests of concrete to determine the suitability of a variety of materials for use in concrete on numerous projects.

Developing methods and procedure for exploring aggregate deposits which have resulted in more efficient use of available materials.

As mentioned above, the laboratories are unusually well equipped and maintained. Operations are segregated according to type in various rooms of the basement. The equipment includes apparatus which is standard in all concrete laboratories, and in addition several pieces of equipment which are unique to the Denver office and are establishing interesting precedents.

Layout and Equipment

For example, permeability of concrete, a factor of the utmost importance in structures withstanding hydraulic pressures, is tested on a routine basis with a permanent installation of equipment. Essentially the permeability apparatus (Fig. 2) consists of a chamber for holding concrete cylinders (as large as 18 in. in diameter) while a measured amount of water is forced through the concrete at pressures as high as 500 lb. per square inch. A standardized system of permeability factors has been established so that concretes may be intelligently compared in this quality.

The calorimeter rooms are another indication of advanced control in research. It is obviously impossible to reproduce the thermal conditions existing in the center of a mass of concrete such as Boulder Dam, but the calorimeter rooms, adiabatically controlled by sensitive equipment, provide a close approximation. Cylinders, 17- x 17-in., are placed in the rooms in containers insulated to protect the specimens against small sudden changes in temperature caused, for instance, by an operator opening the door. A resistance thermometer is placed in the specimen and, through the use of delicate control equipment (Fig. 3), the temperature of the room is kept the same as that of the concrete specimen, which has also been cast under controlled conditions. As the temperature rises in the mass of concrete during hydration, the temperature of the room rises also, and a detailed record of the behavior of the specimen is charted by another set of instruments.

The most spectacular piece of equipment in the laboratories is a vertical hydraulic compression testing machine (Southwark-Emery) with a capacity of 4,000,000 lb., one of the largest units of this kind in the world (Figs. 4 and 5). It will test cylinders 6 ft. high and 3 ft. in diameter, although at present cylinders 3 ft. high and 18 in. in diameter are considered large enough for ordinary purposes. The machine is also utilized for metal testing.

Most compression tests are made on a smaller Southwark-Emery machine which has a capacity of 300,000 lb. in compression and 200,000 lb. in tension. It is a universal-type hydraulic testing machine, equipped (as is the 4,000,000-lb. unit) with a time-loading device invented and patented by R. F. Blanks. Bars are tested in this machine for flexure and small cylinders for elastic deformation by means of additional equipment.

A small compression machine of 75,000 lb. capacity tests 2-in. cubes and 3-in. diameter cylinders in the cement studies.

There are two concrete curing rooms —one with 50 percent relative humidity and 70 deg. F. temperature (used especially for the storage and measurement of volume-change bars) and the other with 100 percent relative humidity and 70 deg. F. temperature (used for the storage and curing of test specimens).

Much importance is placed on the durability of both the aggregate materials and the finished concrete. Freezing and thawing tests (Fig. 6) are conducted with a cycle of 1½ hr. freezing at 5 deg. F. and the same period of thawing at 70 deg. F. Sodium sulfate solution is utilized in durability tests of another type—resistance to crystallization of the salt in interstices of the aggregate or concrete. Resistance of concrete to silt-laden water is measured in special equipment designed in these laboratories.

Fig. 4: Making an elasticity test of an 18- x 36-in. concrete cylinder in the 4,000,000-lb. compression testing machine which is equipped with a time-loading device invented by a Reclamation bureau engineer.

Fig. 5: Close-up of a 36- x 72-in. cylinder under test in the same machine

Fig. 6: A set of concrete specimens being transferred from the freezing to the thawing tanks in making a freezing-and-thawing test

Some other of the more interesting pieces of apparatus are: a special scale for the rapid determination of the specific gravity and moisture content of aggregate; grinding machinery for making parallel surfaces on ends of large test cylinders; a wire saw for cutting test specimens; electric furnace for calcination of cement materials; complete screening equipment for many sizes and types of samples; concrete mixers, used not only for mixing Bureau control batches but also for testing the performance of various makes of mixers; crushers and similar equipment with a newly installed dust-control apparatus; a complete chemical laboratory; complete petrographic equipment, including apparatus for taking photomicrographs; frames developed for maintaining constant length during the mass-curing temperature cycle; torsion-testing machine for metals, 60,000 in.-lb. capacity; impact testing machine for metals; Brinnell hardness testing machine.

A Philosophy of Concrete

As the Bureau concrete engineers have watched the progress of their investigations from the selection of aggregates to the inspection of complete structures, they have evolved what might be called a philosophy of concrete. It is based primarily on experience, but it has drawn from every prominent school of thought. The result is that the Bureau engineers have written a "Manual for the Control of Concrete Construction," now available for distribution and mentioned elsewhere in this issue.

The concrete laboratory's "target," with a bulls-eye labeled "Good Concrete Practice," is a chart which summarizes the new handbook and also the Bureau's philosophy of concrete. It is reproduced in Fig. 1 with the Bureau's permission.

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* The writer is indebted to the engineers directing Bureau of Reclamation concrete control for their coöperation in the preparation of this article, and to K. C. Bellows, assistant engineer on concrete control, for providing much of the detailed information.

J. E. Baker Co., York, Penn., has purchased 235.75 acres in Jackson township near Fremont, Ohio. The company does not intend to open a quarry this year, but will move considerable equipment to the property when it is opened.

Kelley Island Lime and Transport Co., Cleveland, Ohio, recently placed its Marblehead, Ohio, quarry on a second shift, to fill a large contract for stone to be used on a Detroit W.P.A. street project. Production has also been increased at the Kelley's Island quarry to fill orders for flux stone for steel mill consumption.

Columbia Quarry Co. Wins Safety Trophy Third Time

The crushed-stone producers' safety contest of 1937, conducted by the Bureau of Mines in coöperation with the National Crushed Stone Association, resulted in a marked reduction in the frequency of accidents among men employed at the quarries and crushing plants. Records submitted to the Bureau of Mines by the companies enrolled in the contest revealed a reduction of 22 percent in the accident-frequency rate. On the other hand, the accident-severity rate was higher than in 1936 due to an increase of two in the number of fatalities during 1937 and the heavy weighting in days lost chargeable for each fatality in computing the severity rate.

The "Sentinels of Safety" trophy is awarded annually by the *Explosives Engineer* (Hercules Powder Co.) to the plant establishing the lowest accident-severity rate, that is, the fewest days lost from accidents per 1000 man-hours of employment or exposure to risk. When two or more plants operate without a lost-time accident, the best record is considered to be that showing the largest number of man-hours worked; all other plants having accident-free records are awarded certificates of honorable mention.

The winning plant for the 1937 contest was the Krause No. 1 limestone quarry, St. Clair County, Illinois, near Columbia, Monroe County. This plant was operated by the Columbia Quarry Co. and worked 219,069 man-hours during 1937 without a lost-time accident. This is the third successive year that the Krause quarry has won the National Crushed Stone Association contest, and it is the fifth successive year that the plant has operated without a lost-time accident. The total volume of employment during the five years amounted to 946,067 man-hours. The quarry has been enrolled in the contest since 1931, and has not had a lost-time accident since September 22, 1932.

In addition to the Krause quarry, ten other open quarries and two underground mines were operated throughout the year 1937 with accident-free records, and each plant, except the trophy winner, was therefore awarded a certificate of honor. The plants awarded these certificates were:

(1) Winnsboro granite quarry, Winnsboro, Fairfield County, South Carolina, operated by the South Carolina Granite Co., 179,661 man-hours in 1937.

(2) Piqua limestone quarry, Piqua, Miami County, Ohio, operated by the Ohio Marble Co., 145,132 man-hours in 1937.

(3) Bell limestone mine, Bellefonte, Centre County, Penn., operated by the American Lime & Stone Co., 112,526 man-hours in 1937.

(4) Marquette limestone quarry, Cape Girardeau, Cape Girardeau County, Missouri, operated by the Marquette Cement Manufacturing Co., 97,824 man-hours in 1937.

(5) Pixley limestone mine, Independence, Jackson County, Mo., operated by the Stewart Sand and Material Co., 87,384 man-hours in 1937.

(6) Rolesville granite quarry, Wake Forest, Wake County, N. C., operated by the Southern Aggregates Corp., 83,207 man-hours in 1937.

(7) White Haven sandstone quarry, White Haven, Luzerne County, Penn., operated by the General Crushed Stone Co., 80,506 man-hours in 1937.

(8) Akron limestone quarry, Akron, Erie County, N. Y., operated by the General Crushed Stone Co., 56,444 man-hours in 1937.

(9) Plainville No. 4 trap rock quarry, Plainville, Hartford County, Conn., operated by the New Haven Trap Rock Co., 47,342 man-hours in 1937.

(10) Rocky Hill No. 3 trap rock quarry, Rocky Hill, Hartford County, Conn., operated by the New Haven Trap Rock Co., 17,814 man-hours in 1937.

(11) Howes Cave limestone quarry, Howes Cave, Schoharie County, N. Y., operated by the North American Cement Corp., 17,616 man-hours in 1937.

Bert D. Paine, Inc., Oklahoma City, Okla., has announced that it will begin construction at once of a $106,000 plant to manufacture rock wool using reverberatory furnaces fired with natural gas. Silica and high calcium limestone will be the raw materials. According to the local press, with the new industry will come something new in industrial relations. All employes of the company will be given an opportunity to become part owners of the concern, and to live on five-acre tracts where, by raising crops and keeping a cow, they would be almost totally self-sufficient. The plan, Mr. Paine said, will assure the company a continuous labor supply and will insure the employes against seasonal slacks and possible resultant layoffs. E. S. Perkins, research engineer formerly with the Eagle-Picher Mining Co., will direct the plant's employe-relations division.

Sodium Sulphate—Freezing and Thawing Tests Reveal

Effect of Deleterious Materials in Concrete

By R. R. LITEHISER*

DELETERIOUS SUBSTANCES in aggregate are objectionable, particularly in coarse aggregate for use in concrete. In Ohio, the following materials in gravel aggregate are considered deleterious: shale; limonite, or yellow oxide of iron, 2 $Fe_2O_3 3H_2O$, a common ingredient in what are termed chocolate bars or nigger toes; ochre or clay stained red or yellow by iron compounds; hematite or red oxide of iron, Fe_2O_3, pyrites, or iron sulphide, FeS_2; and chert, commonly known as an impure flint. However, not all cherts are considered deleterious.

Physical or chemical changes after the deleterious materials are made into concrete cause the harmful effect, the degree of harmfulness depending largely on the amount of protection from weathering agencies which is given by the concrete of which they are a part. If the deleterious material is at the surface it is readily attacked by weathering agencies, but if there is a protecting layer of concrete over it no particular damage may result. Of course, the larger the percentage of deleterious materials the greater likelihood there will be of particles at or near the surface.

In the accompanying illustrations may be seen typical cases of damage caused by deleterious materials. Fig. 1 shows the unsightly staining effect on a bridge abutment caused by the oxidation of pyrite bearing gravel. Oxidation of this kind often is accompanied by sufficient volume change to "pop out" the thin layer of concrete over it, and when once exposed to the weather the oxidation is accelerated and continues until the deleterious material disappears, leaving the stain to mark the spot where the material was located.

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R. R. Litehiser

Fig. 2 shows the effects of deleterious materials in concrete on a bridge railing. While the effects may not be so noticeable on abutments, on anything ornamental like a bridge railing they are particularly unsightly.

Although "pop outs" as a result of shale in concrete may not be so objectionable because no stains are noticeable, their occurrence is not desirable. No stains are usually found as the shale does not as a rule contain oxidizable iron.

Testing Concrete With Deleterious Materials

To test the effect of deleterious materials in concrete, coarse aggregates known to have deleterious ingredients were used in making concrete specimens, consisting of 6- x 6-in. cylinders, which were subjected to freezing and thawing cycles in the laboratory. The cycle requires 24 hours and consists of freezing water-saturated specimens at 0 deg. F. followed by thawing in water at 60 deg. to 70 deg. F.

Results of these tests show that at 20 cycles the specimen cracked, and at 40 cycles, Fig. 3, a slab of concrete was pushed off exposing the offending piece of aggregate, identified as a "chocolate bar" containing limonite; and at 60

*Abstract of address before the National Sand and Gravel Association at convention in Cincinnati, Ohio. Now secretary New York Crushed Stone Association, Inc.

Results of artificial freezing and thawing tests. Fig. 3 shows what happened to a test cylinder of concrete after 40 cycles of freezing and thawing. Fig. 4: Test cylinder containing objectionable chert after it had been subjected to 20 cycles of freezing and thawing. Fig. 5: Close-up showing the breaking up of the chert particle itself, leaving a hole in the concrete

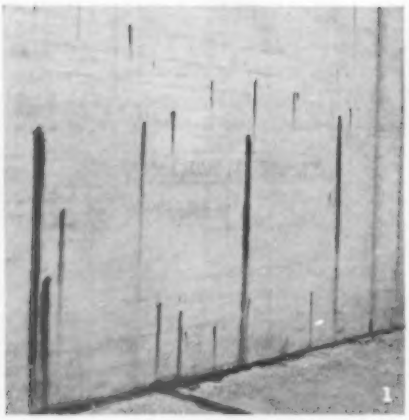


Fig. 1: Showing effect on bridge abutment produced by oxidation of pyrite bearing gravel. Fig. 2: Damage from "pop outs" and stains on bridge railings resulting from deleterious gravel is particularly objectionable

cycles the concrete showed all the offending aggregate particles in their natural color.

Other test cylinders of concrete containing deleterious materials, such as limonite, ochre, and hematite, subjected to 20, 40 and 60 cycles of freezing and thawing, again showed all these objectionable materials revealed at 60 cycles.

Two Kinds of Cherts

Cherts may be divided into two varieties which ordinarily are easily distinguished. One group includes the white or gray colored, non-waxy cherts which are absorbent, and in the other group may be placed the waxy cherts ranging in color from yellow, through brown, into black. The former group may be classed as deleterious.

Figs. 4 and 5 show how deleterious chert particles affect concrete after 20 cycles of freezing and thawing.

The value of imposing restrictions on deleterious materials in aggregate specifications was demonstrated by experience with a retaining wall having 266 sq. yd. of surface exposed. In this area about 100 "pop-outs" of the staining variety showed up within three months after the wall was poured. The contractor was required to repair the damage by digging out the deleterious particles exposed, enlarge the holes to provide proper bond for patching and fill the holes with 1:2 mortar, and then re-rub the wall to obtain a uniform and neat appearance. This repair job in terms of aggregate cost the contractor 64 cents per ton.

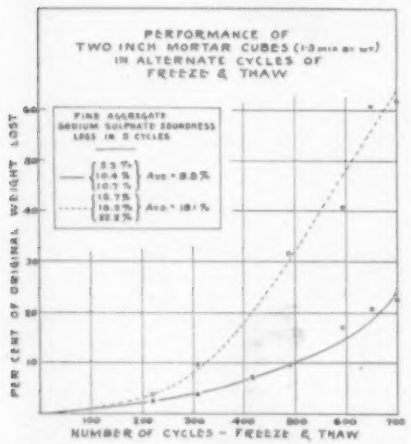


Fig. 6: Graph showing the comparative average sodium sulphate soundness loss in five cycles of three sands

Sodium Sulphate Soundness Test Loss

Fig. 6 shows information which required 2½ years to develop. The data compared the average sodium sulphate soundness loss in five cycles of three sands within the present specification limit of 12 percent and of three sands with an average sodium sulphate soundness loss outside this limit, with corresponding average freeze and thaw losses. No difference was apparent between the two grades of sand as established by the sodium sulphate soundness test up to 100 cycles of freeze and thaw, but beyond this point there was a noticeable difference. This soundness test is now regarded as of considerable value although judgment still plays a part in interpreting the results.

In conclusion, it may be stated that the present accepted specification limitations covering deleterious materials cannot be made less exacting. This is particularly true where the unmarred beauty of surface is an architectural consideration, and in this case stricter limits may be called for.

Where unmarred beauty of surface is an architectural consideration even stricter limits are justified. This challenges the engineer and aggregates producer alike, the former to build the best concrete and the latter to furnish the best aggregate.

Merchandising Agricultural Limestone

COLUMBIA QUARRY CO., St. Louis, Mo., is mailing a very attractive circular in green and white 9 x 12 in., folded once, featuring its high calcium limestone for agriculture. The circular is headed "Calcium," which alone gives it distinction. "Agricultural Limestone is a hackneyed term, but "calcium" is new to many and eye-appealing.

With the help of simple picture charts and quoting authorities at the Missouri Agricultural Experiment Station, the folder drives home the *triple* value of calcium in the soil: (1) nodulation of the roots of legumes, like clover and alfalfa, which make nitrogen; (2) as a plant food; (3) as a soil sweetener and soil conditioner.

To drive home the advantages of using the company's own products, the following interesting sales arguments are used:

"Is It a High Purity Limestone? Because so much limestone is marketed by the Columbia Quarry Company for chemical purposes, great care is taken in the preparation of a "naturally" high quality limestone. Columbia guarantees its purity and stands behind its guarantee.

"Is It Prepared and Graded Well? Columbia Limestones are well-graded from fine to coarse material. Chock-full of quick-acting fine limestone so necessary for best results with enough well-graded coarse material to 'stretch its good qualities out' over a long period of time.

"Is It a HIGH-CALCIUM *Limestone?* Both Columbia and Valmeyer limestones are HIGH-CALCIUM limestones. That is, their neutralizing values are made up by CALCIUM content and not a heavy percentage of magnesium. Insure good nodulation and adequate CALCIUM food supplement by applying Columbia or Valmeyer HIGH-CALCIUM Limestone."

A four-color poster in red, yellow, green and black is designed for the same purpose. It is headed "Why make hay balers of your cows?" It is explained in attractive lettering and colors that "in order to get 2 lb. of protein a day, a cow must eat 18 lb. of alfalfa or 27 lb. of soy beans (hay produced without limestone) or 11 lb. of alfalfa or 15 lb. of soy beans (hay produced with limestone)." It says, "Feed your cows by feeding the soil."

E. J. Krause, the president of the Columbia Quarry Co., was once a commercial artist. Also, he once owned and operated the finest dairy farm in St. Louis territory. Therefore, these pieces of promotional literature represent the work of an expert.

First Lime Plant Installation Demonstrates Efficiency

DUST COLLECTION ON ROTARY KILN

By JOHN MOCINE
General Superintendent, United States Lime Products Corporation, Sonora, Calif.

TESTS HAVE INDICATED that the first installation of a dust collector on a rotary lime kiln has proved effective in removing fine dust particles from the atmosphere. The United States Lime Products Corp., Sonora, Calif., after some unfortunate experience in contesting law suits initiated by property owners who complained about dusts emitted from the stacks of the kiln, installed the dust collection system shown in the illustrations.

The Multi-clone dust collection installation on the 6- x 120-ft. rotary lime kiln also serves as the draft system, displacing a 36-in., inside diameter, by 78½-ft. steel stack which, for the present, has been merely blanked off with a sliding gate.

For the purpose of control and to secure operating data, small piping and wiring connecting draft gauges, pyrometers and control apparatus, are carried back to the firing control board. With the new dust collection installation, the following data have been obtained: normal kiln draft; temperature at kiln throat; differential drop between the two legs of the multiclone; draft pressure at fan inlet; temperature at fan inlet; and degree of fan damper opening.

Operating data on a test run of the kiln with the dust collector installation show that 40.83 tons of lime were produced in 24 hours, and the dust collected totaled 1.173 tons. Other data are as follows:

Atmosphere temperature	56 deg. F.
Temperature at kiln throat	800 deg. F.
Temperature at fan inlet	350 deg. F.
Total temperature drop in system	450 deg. F.
Normal kiln draft pressure	.42-in. W.
Drop in multiclone	2.60-in. W.
Amount of combustion products—cooling air handled, relative areas of openings only	706-90 sq. in.
Calculated total volume passing through multiclone, based on temperature drop	11,800 c.f.m.
Rexvane damper setting, percentage of arc	70%
Estimated reserve capacity	30%
Electrical input at motor feeders	9.87 kw.
Percentage collected, estimated at	95%

As shown in the illustrations, the duct of the collector near the inlet to the kiln is fitted with a rotative band which has a number of slots matching similar slots in the duct itself. This permits the addition of cooling air up to about 40 percent of the cross sectional area of the piping. The fan is rated to withstand 582 deg. F., and there is a large temperature drop in the duct system and the multiclone itself so that in practice it is only necessary to admit cooling air to the extent indicated in the above test data.

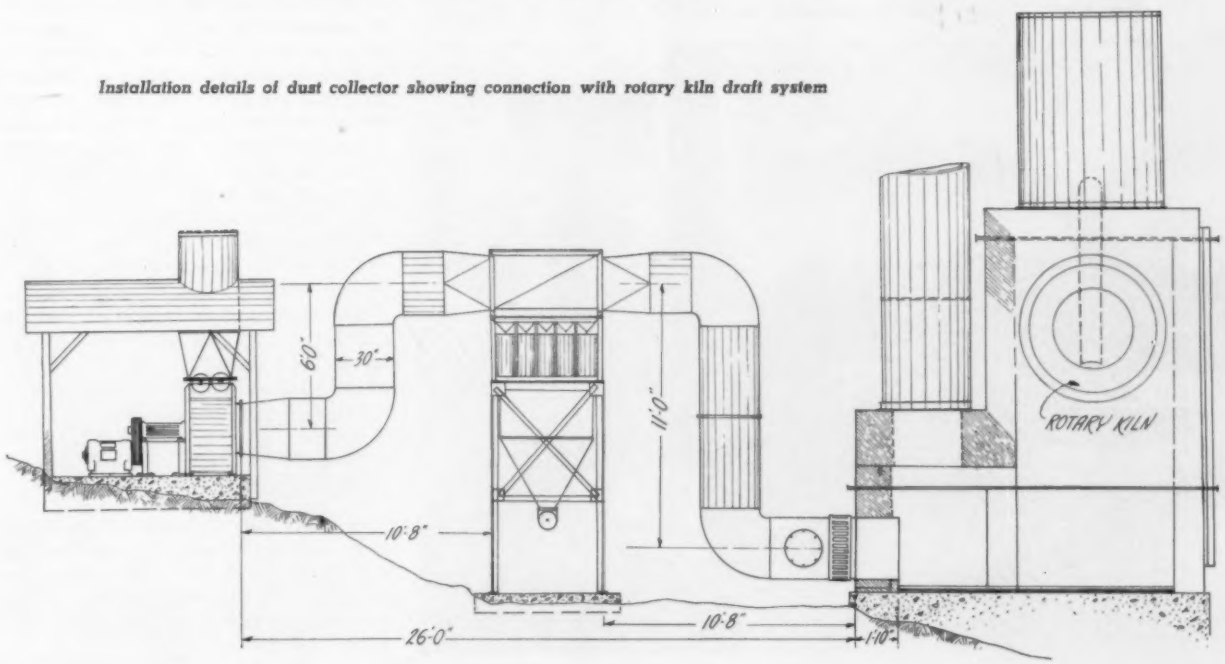
It has been found that the dust collection system permits the kiln to be placed in production faster than it could be under former conditions, and uniformity of combustion is much better. After the starting adjustments have been completed, they are rarely varied.

Fuel consumption is somewhat lower, but exact figures as to the amount are not yet available. However, the saving is certainly more than sufficient to absorb the cost of the small amount of power required.

While the actual efficiency of dust collection itself has not been determined, it is estimated to be at least 95 percent and there is no observable dust escaping to the atmosphere. At present no use is being made of the dust collected, but analysis shows it to be suitable for agricultural purposes.

A screen analysis of the dust gives

Installation details of dust collector showing connection with rotary kiln draft system



Left: Close-up of dust collector, with fan damper control to the left and dust discharge valve mechanism in center. Center: Fan damper control. Right: Dust discharge valve

the following gradation: minus 65-mesh, 100 percent; minus 100-mesh, 99.9 percent; minus 200-mesh, 97 percent; and minus 325-mesh, 85 percent. A chemical analysis shows: acid insoluble, 0.66 percent; R_2O_3, 0.97 percent; $CaCO_3$, 23.06 percent; MgO, 1.4 percent; $CaSO_4$, 1.22 percent; $Ca(OH)_2$, 6.37 percent; and CaO, 66.32 percent.

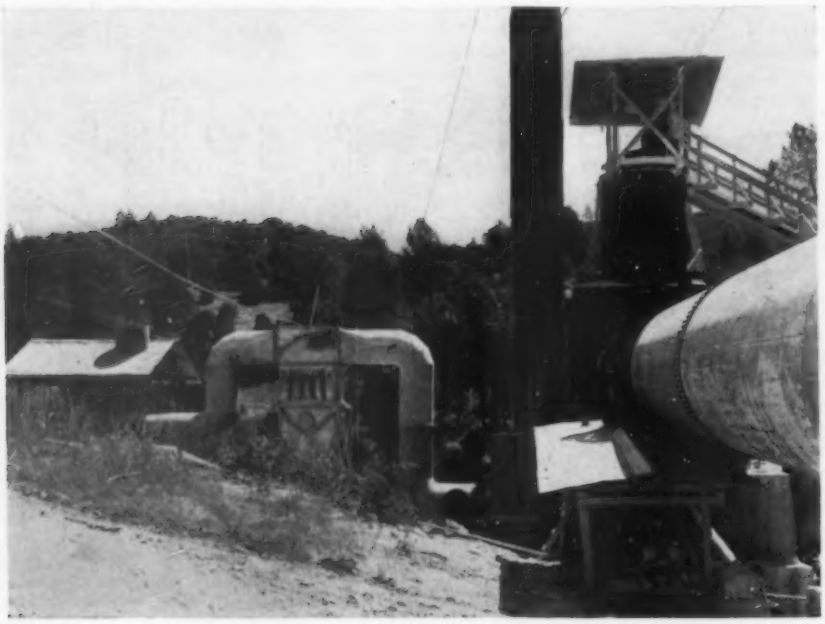
Construction Details of Dust Collector

The dust collecting unit is a standard Multiclone, consisting of twenty-five 9-in. tubes, installation details of which are shown in the drawing. Its efficiency results from the fact that it is designed in accord with the fundamental physical law which states that the separating action of a centrifugal type collector varies inversely as the radius and directly as the square of the tangential velocity of the gas. Therefore, decreasing the diameter of the separating tube reduces the maximum travel of the dust particles and increases the centrifugal force available at a given velocity. As the diameter of the separating tube is decreased, finer particles are collected. There are no filters or screens in this type of dust collector. Illustrations show the dust collector, fan damper control, and dust discharge valve.

In operation, the gas from the kiln enters the battery of tubes in the dust collector and is forced against a series of radial vanes giving it a rapid swirling motion that increases as it descends to the narrowed outlet at the bottom where the dust is deposited. The centrifugal action is such that the pressure is much greater at the circumference, permitting the return of the cleaned gas upward and out through the opening provided for this purpose.

Single flanged inlet and outlet connections make for stream line flow of the hot gas from the kiln. A common hopper is provided for all tubes with a flanged dust discharge connection.

General view of rotary lime kiln installation, showing dust collector to the left



Open Tripoli Deposit

MINERAL PRODUCTS Co., of Arkansas, near Hot Springs, has set up a plant to produce tripoli products. The material is wheeled from the deposit to a truck loading bin and hauled to the plant. Trucks go up a ramp over a bin from which it is fed by a screw conveyor to the oil-fired dryer. The dried material is elevated up a narrow tower to a 12-ft. Raymond air separator which is directly above a 10-ft. separator. A 325-mesh product is taken from the 12-ft. separator, the rejects dropping into the 10-ft. separator for a 200-mesh separation. Rejects from the lower separator are wasted. The 200-mesh and 325-mesh products are chuted to a two-compartment steel bin over a two-spout bagger. Capacity is about 40 tons per day, proportioned about 3 sacks of 325-mesh to 1 sack of 200-mesh. The raw material is so fine that no crushing is necessary. Finished products are sold to paint manufacturers and producers of cleaning compounds.

The Mineral Products Co. of Arkansas has taken over the assets and has assumed the liabilities of the Mineral Products Co., Memphis, Tenn., and its subsidiary, the Mineral Products Co. of Arkansas, Inc. S. C. Carlstrom is president and in charge of sales with offices in St. Louis, Mo.

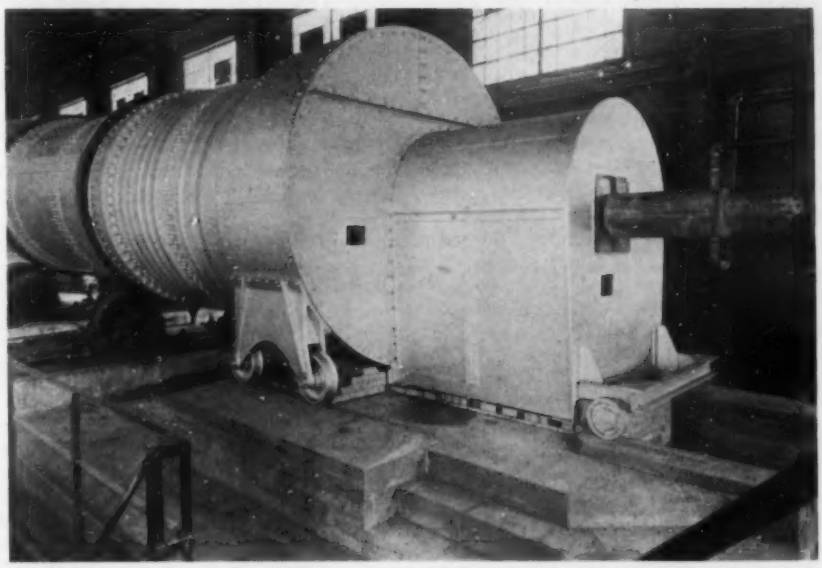
OLYMPIA, WASH., recently purchased two acres of land from Daniel Dwyer for use as a gravel pit. This action was necessary as all the available sources of gravel supply within the city had been exhausted.

Remodel Kilns of Valley Forge Cement Co. to

IMPROVE CLINKER COOLING

By RALPH S. TORGERSON

VALLEY FORGE CEMENT CO., Catasauqua, Penn., recently made some improvements on the kilns which included the installation of a new type Fuller movable inclined grate cooler manufactured by the Fuller Co., Catasauqua, Penn. Since the installation of the coolers there has resulted a considerable reduction in autoclave expansion and improved grindability of the clinker due to the air quenching. The low temperature of the clinker being delivered to the mill also has increased grinding efficiencies. The Valley Forge installation is a wet-process plant.



Preheated air chamber directly above the primary clinker cooling unit on kiln

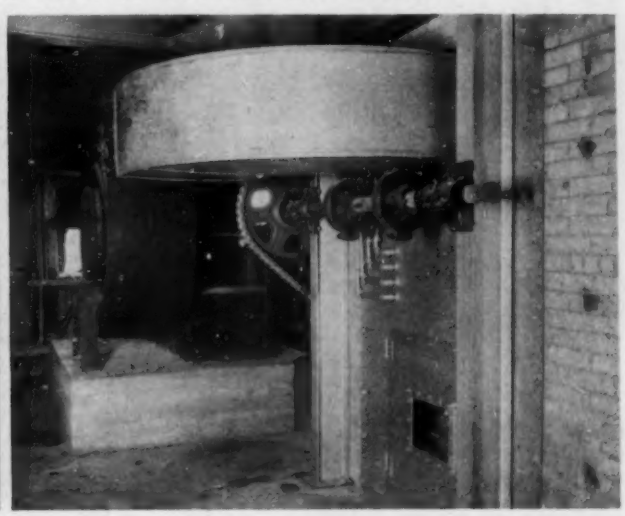
It may be of interest to give a brief description of the original kilns to which improvements in the cooler have recently been made. In 1927, two Polysius Solo kilns with attached coolers were placed in operation—the first installation of its kind in the United States. These kilns had three sections of different diameters: a double-shell cooling section, 9 ft. 10 in. in diameter, 31 ft. long; a burning section, 11 ft. 10 in. in diameter, 50 ft. long; and a preheating section, 8 ft. 10 in. in diameter, 142 ft. long. All the air for combustion was taken in through ports in the shell of the cooler section of the kiln.

Kiln burners for pulverized coal, a special type made by the Polysius Corp. for the Solo kiln, consisted of a steel pipe which projected as a cantilever through the cooler section into the kilns, the length of the pipe being adjustable, so that the burning zone could be changed, within limits, at will. The cooling section of the kiln discharged through air-locked, automatically controlled valves to Skipulters, which extended from the ends of the cooler over a bridge structure to the west side of the storage building, where they discharged into the clinker storage through automatic scales.

New Cooler

With the installation of the new Fuller movable incline grate cooler, the cooler section of the old Polysius kilns became a part of the burning section. The illustrations show the firing end of

Left: Interior of the primary clinker cooler. Right: Air fan, air duct and eccentric drive of the cooler



the kilns as they now appear with the new cooler. A flow diagram of the Valley Forge installation shows where the primary and secondary coolers are located.

The primary unit is operated in accordance with the preheated air requirements of the kiln, which, in all cases, is sufficient for thorough quenching of the clinker. Generally speaking, the temperature of the clinker being delivered to the primary unit will average approximately 2500 deg. F., while that leaving the primary unit will run between 800 and 1200 deg. F. As mentioned before, the primary unit is operated as an air quencher and an air preheater to the kiln.

On the other hand, the secondary unit is operated as an ultimate or final cooler, the speed of which is regulated to reduce the temperature of the clinker to between 120 and 140 deg. F., when discharged to the clinker pit. The bed on the secondary unit is carried considerably thicker than on the primary unit and the cooler is operated at a slower speed.

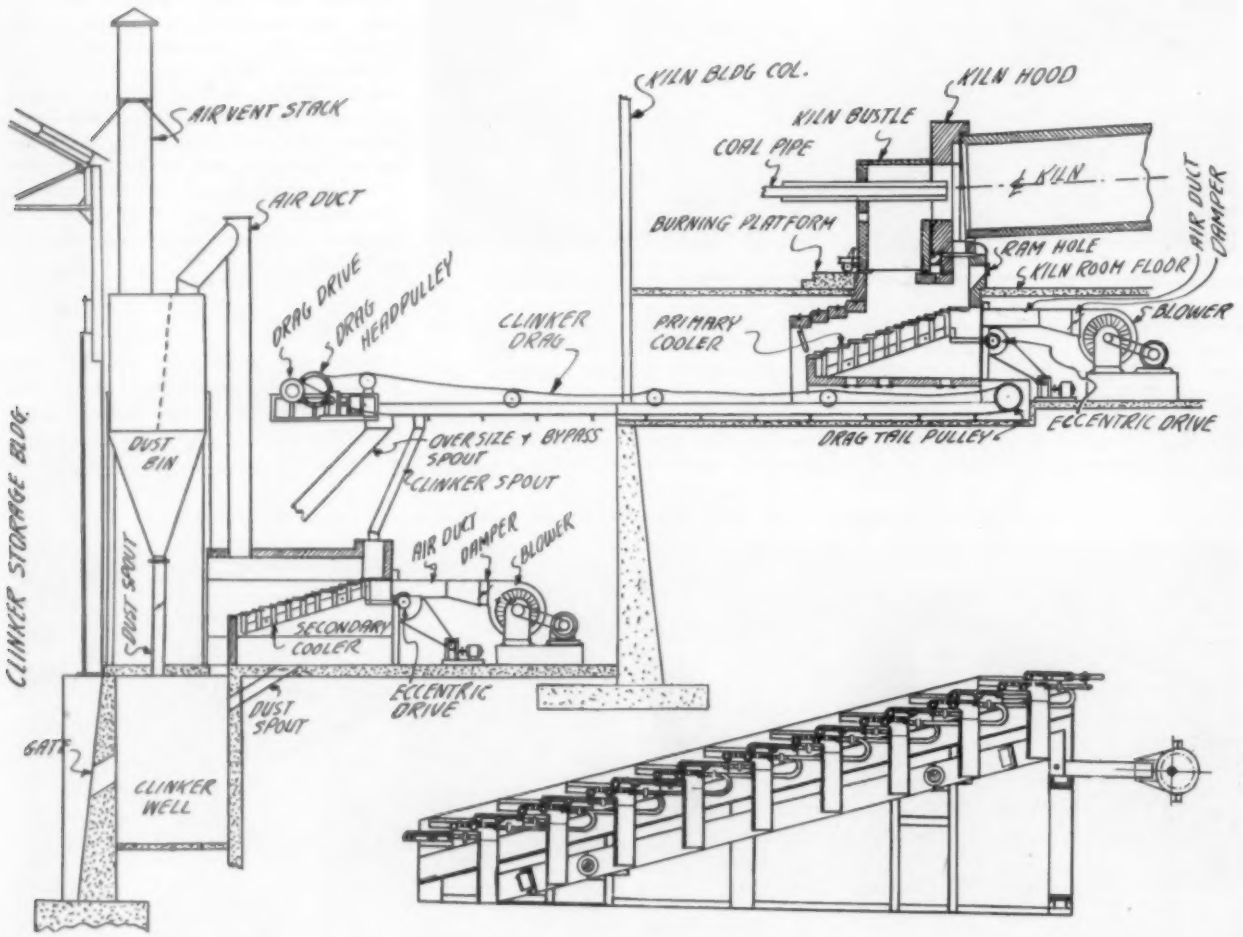
It will be noticed from the illustrations that the cooler is of comparatively simple construction. Grates are of water-cooled, cast-iron construction, and no high temperature metal is used in the construction of the cooler. The only moving parts are the rollers carrying the movable frame and the eccentric drive, all of which are located outside of the cooler housing.

The cooler can be built on almost any pitch up to 18 deg. without the possibility of any clinker short-circuiting over the grate. It may also be built in any width and almost any length with a flexible speed motor regulating the strokes of the movable grates and the length of the strokes being controlled on the eccentric. The speed of the flow over the grates can be varied in accordance with requirements.

As shown in the illustration, the stationary grates are mounted on the wall frames (indicated by shading), and the movable grates are supported on the movable frame and carried by the four rollers. There are air holes or slots through both the secondary and stationary grates. This is one source of air quenching which is fed directly up through the bed of the clinker. Another supply of air enters between the movable and stationary grates where the clinker is cascading from grate to grate on both the back and forward strokes. The water cooling system is relatively simple as the movable grates are on one complete circuit and the stationary grates on another complete circuit. The only flexible connections are at the top and bottom of the grates. Water connections through the entire length of the grates are of rigid construction.

When final and complete cooling is desired on a single stage unit, the cooler

(Continued on page 50)



Above: Flow diagram showing location of primary and secondary clinker cooling units. Below: Elevation plan of clinker cooler grates. Stationary grates mounted on the wall frames are shown shaded, and the movable grates supported on the movable frame and carried by the four rollers are shown in black. There are air holes or slots through both the secondary and stationary grates. Another supply of air enters between the movable and stationary grates

Left: Dredge boat of Brookhaven Gravel Co. relays sluiced material to the sizing screen. Center: Long sluice line from dragline. Right: Gravel is excavated by dragline and sluiced into the lake where it is relayed by pump to the plant. Note long flume in background leading to the plant

Three Plants Develop Cost-Saving Equipment

Unusual Methods of Handling Sand, Gravel

By BROR NORDBERG

WHILE ON A RECENT TRIP through the South, we had occasion to observe the operation of three sand and gravel plants that demonstrate interesting methods of delivering material from the deposit to the screening plant. For the purpose of discussion, these plants are grouped although the principle of excavation and plant delivery is decidedly different in each case.

Excessive clay in the matrix prompted one of the plant designs under consideration, difficulty in loosening and caving bank material in a dredging operation was the reason for an unusual design in another, and the third represents probably "the last word" in cutting overhead and production costs.

One of the plants, the Brookhaven Gravel Co., at Crystal Springs, Miss., was built in 1936 and is producing specification aggregates for Mississippi's highway building program. When originally constructed, the plant was designed for direct pumping by dredge to a stationary screening plant. This method of operation was changed to dragline excavation, material being sluiced to the dredge boat when difficult pumping was encountered and it was necessary to fill contracts without delay.

The company has 500 acres of gravel land, containing about 50 percent metal, which is covered by 3 to 5 ft. of overburden. About 10 to 12 percent clay must be washed from the sand and gravel when producing highway aggregates.

Operating in a "lake" near the plant, the dredge boat relays sand and gravel sluiced to it from a dragline operating on the bank above. Many of the plants in the area pump overburden along with sand and gravel to the screening plant and wash it out over the screens, but at this plant the 1¼-cu. yd. Northwest gasoline dragline casts overburden back into the exhausted pit.

Sluicing Sand and Gravel

A 300-ft. flume, 36 in. in width, was built to carry the dragline-excavated material into the lake for re-handling to the screening plant. The flume has a slope of ¾ in. to the foot and its bottom is lined with steel plate. Excavated material is placed in a gravity-feed hopper by the dragline, and water is introduced at the head of the flume to wash the material into the lake.

A 6-in. centrifugal pump keeps a continuous stream of water running through the flume and is supplemented by the discharge of a 4-in. line, 10 ft. below the hopper. A total of 1000 g. p. m. is introduced, to keep all material in suspension and in constant agitation.

By keeping the material in constant agitation, it is subjected to intensive scrubbing action in its travel through the flume, by its contact with the steel plate and by rubbing of individual particles against others, so that by the time it flows into the "lake" the product is already practically 100 percent clean. The dragline has a 65-ft. boom, making the limits of operation into one flume a pit about 130 to 140 ft. wide, half on each side of the flume. The dragline is moved up to another hopper station closer to the flume discharge when all material within reach of its bucket is exhausted.

Movement in this direction, of course, reduces the scrubbing action, which is proportionate to the length of travel through the flume. When the material within reach of the dragline is exhausted, the flume is moved to a new location, about 140 ft. from the old. The move is easily accomplished, since the flume is of wood construction supported on wood timbers. Moves are accomplished when there is sufficient washed gravel and sand stored in the lake to keep the dredge boat in full operation.

Upon entering the lake the fine, clayey material remains in suspension longer than the sand and gravel and floats out further in the lake before settling. When it accumulates to excess, it is pumped back into the exhausted pit.

Sand and gravel are pumped by a 10-in. Amsco pump to a spread table over the screening plant and sized for direct loading into railroad cars. The gravel screen is 24 ft. wide with a 45-deg. slope, and gravel is run off directly into cars on one side of the plant. Fresh water is applied across the entire width of the screen to loosen sand which adheres to the gravel. The washing action in the sluice and the

second washing in pumping has removed practically all clay and silt before the material reaches the screen.

Sand screens, for making concrete sand and mason's sand, are set at a 20-deg. angle. Oversize or gravel is chuted to bins on one side of the plant and directly into railroad cars, and the sand throughs go to bins for direct loading into cars on the other side of the plant. The plant produces 15 to 25 cars of gravel in 10 hr. Although the material is re-handled, the added cost is offset by the washing efficiency and the increased percentage of solids that may be put through the dredge pump as compared to direct pumping from a pit or bank.

Screening plant of Brookhaven Gravel Co. loading gravel into cars on one side and sand on the other. Large spread table is shown on the upper right

Low Cost Gravel Plant On Railroad Flat Car

The second gravel plant under consideration is a dragline operation in Louisiana that produces specification washed gravel at extremely low cost. This plant is portable for the purpose of mobility within the limits of the deposit and is operated by a permanent, long established producer.

This plant is built of steel and mounted on a 35-ft. railroad car for operation on standard gauge track to make moving about in the pit as simple and cheap as possible. Being mounted on a standard gauge car, the plant can easily be moved to any of the company's other pits, if so desired.

The deposit contains about one-third gravel, with very little stone over 2 in., so that little gravel is wasted in meeting a specification for 1½-in. to ¼-in. gravel. The plant wastes all sand (¼-in. minus) and produces gravel for direct loading into cars. No provision is made for bin storage.

Excavation is by means of a 2-cu. yd. Bucyrus-Erie 46 dragline with a 70-ft. boom. The deposit is excavated downward to depths of 30 ft. and overburden is cast back into the exhausted pit. The method of operation is to have the dragline move in a straight line and to lay standard gauge track as changes in location are made to permit the excavator to unload directly into the plant hopper.

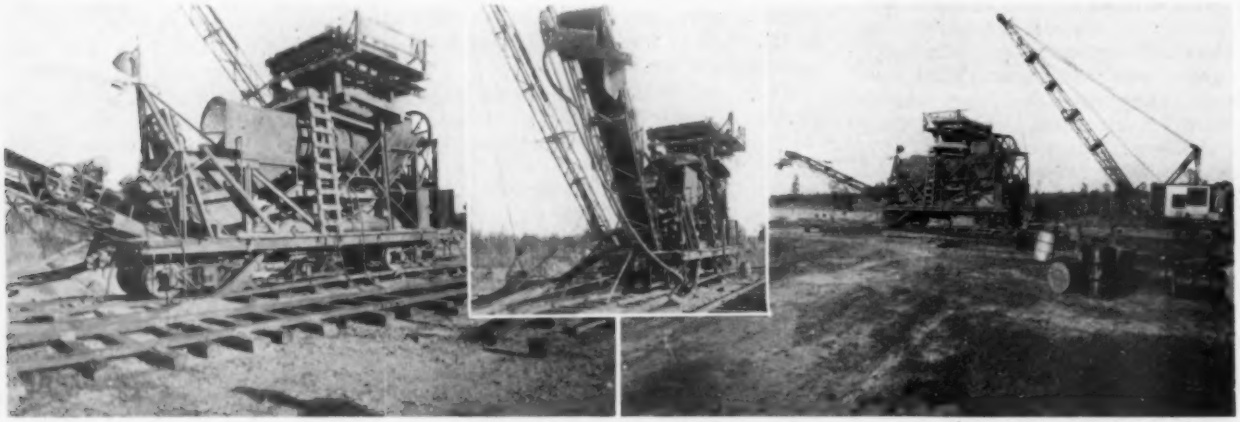
A standard gauge spur track is extended continuously as the plant and dragline are moved, so that cars can be handled to the L and A railroad as soon as they are loaded from the plant. Between this spur and the dragline is the track over which the plant is moved. About 90 ft. of track are maintained for the plant, rails being taken from the back end and placed ahead for each move as the dragline progresses. The plant is generally moved about 30 ft. each time.

Handling Wash Water

The most difficult part of the moving process is in the handling of wash water for screening. At present, water is pumped to the plant by a 5- x 6-in. Economy pump which has a 6-in. suction. Water is delivered through about 700 ft. of pipeline, the first 350 ft. of which is 10-in. and the remainder is 6-in. in diameter. The line is run between the two sets of standard gauge tracks to the plant, where an 18-ft. length of 6-in. flexible rubber hose is connected to a 10-in. diameter pipe on the car. This 10-in. line is the horizontal standpipe to which connections are made for washing lines to the screens, scrubber, etc. About 500 g. p. m. of water are delivered to the plant during operation, and hand valves are turned to regulate the water into other pipelines.

Each time the plant is moved, another section of pipeline is added and the flexible hose is fastened to it. The plant is entirely electrified through a submarine cable. The pump requires about 15 h. p.

A slight amount of clay contained in the deposit must be washed out in producing specification gravel. The dragline excavates about 60 ft. out from the face



Left: Complete aggregates plant mounted on railway flat car. Center insert: Swinging conveyor for direct loading into cars after rinsing. Right: Aggregates plant mounted on flat car and 2-cu. yd. dragline with 70-ft. boom

Dredge boat and aggregate plant of the Monroe Sand and Gravel Co. Note 10-in pipe at the edge of the water which is equipped with nozzles for washing dumped material into the lake

of the deposit, and discharges the sand and gravel into a 6-cu. yd. hopper set directly over a trommel scalping screen.

Water is introduced in the hopper through five 1-in. water lines to keep the matrix fluid so that it will flow into the 3- x 4-ft. scalping screen, and it is also added within the screen through a 2-in. line. The throughs (minus ¼-in.) pass through a steel chute to waste in the exhausted pit.

Plus ¼-in. material passes over an apron to a 5- x 12-ft. rotary scrubber where water is added through a 2-in. line. The scrubber has a rotary belled screen (6 ft. long) at its discharge end with ¼-in. openings. All throughs wash to a 10-in. line below to waste. Plus ¼-in. material passes over a 4- x 6-ft. double-deck vibrating screen with 2-in. and ¼-in. sq. openings on the top and bottom decks, respectively. The gravel is sprayed over this screen.

Minus ¼-in. material and water from this screen join that from the scrubber to waste, and the plus 2-in. material enters another steel chute to waste. Water is introduced at the head of this chute through a 2-in. line to wash the oversize through the chute. The ¼- to 2-in. stone discharges directly to a pivoted 24-in. belt conveyor, 20 ft. centers, and is loaded directly into cars. A 2-in. flexible hose water line to the discharge end of this conveyor furnishes rinsing water over a discharge plate as the gravel flows into cars.

Direct Car Loading

This operation is essentially a railroad shipping point. A switch engine brings three empty cars to the plant at once. When the first two, nearest the main line, are filled, the third car is spotted by the switch engine and is being filled while the engine delivers the filled cars to the main line for shipment.

Should any material be produced for stockpiling, it is loaded as produced into 12-cu. yd. side dump cars and hauled to stockpile by the switch engine, where it is loaded into cars or trucks. As high as 60 tons of washed gravel per hour have been produced.

Only an hour is required to move the plant and place it back into operation, the dragline being used for motive power. The flat-car mounted plant is chained to the rails at each location. Particular care must be taken in maintaining the track gradient so that it will not differ much from a true level. As the car is equipped with standard brakes and couplings, it could be readily moved over railroad lines with very little dismantling of equipment. Total power on the plant is 40 connected horsepower.

Re-handling for Clay Removal

The third plant under consideration is operated by the Monroe Sand and Gravel Co. at Monroe, La., where an interesting system of re-handling to eliminate clay in the material has actually cut the cost of production about two-thirds.

About 20 percent clay is contained in the deposit, which could not be successfully removed without some efficient method of re-washing. The present method of delivering material is by means of a 5-cu. yd. Bucyrus-Erie dragline to cars that dump into a nearby lake from which it is pumped by dredge boat to the screening plant. Each of the 20-cu. yd. side dump cars discharges its load in the lake next to the bank, usually during periods when the dredge is not in operation, partly to serve as an intermediate storage plant.

Twelve feet from the rails, out over the water, is a 10-in. horizontal standpipe equipped with nozzles for undercutting the material and washing it into the lake preparatory to pumping. The pipe is 150 ft. in length parallel to the rails, and is 4 ft. above the water surface. Water in the line (3600 g. p. m.) is furnished by a 12-in. American-Marsh pump under 25 p. s. i., for release through a number of 4-in. flattened-out nipples to undercut the bank of sand and gravel. The nipples are so spaced that a continuous sheet of water is available at the bank for undercutting.

In actual operation, the clay is segregated from the gravel and sand, and the entire mass flows out into the lake. Silt and clay remains in suspension a greater length of time and floats out a considerable distance in the lake before settlement. Occasionally, when much of this waste material accumulates, it is pumped to waste out of the lake.

The sand and gravel, now comparatively free from clay, is pumped by a 10-in. Amsco dredge pump to the screening plant. This method of operation, in addition to contributing toward a clean product, has proven economical. Gravel and sand are in a fluid state after undercutting, making the pumping operation economical and efficient. About 45 percent solids are pumped in the line, where in ordinary bank pumping plants 10 to 20 percent is the average.

RAILROADS OF THE UNITED STATES and Canada have transported nearly four billion pounds of industrial explosives during the last 11 years without an injury to a person or damage to property. This unbroken record in the safe movement of blasting explosives is noteworthy because of the quantity transported. Last year more than 322,000,000 lb. of dynamite, and more than 82,000,000 lb. of black powder were manufactured in the United States, and most of this tonnage was shipped by rail, according to W. S. Topping, chief inspector, Bureau of Explosives, Association of American Railroads.

PLATTSBURG STONE PRODUCTS CORP., Plattsburg, N. Y., had an explosion followed by fire which damaged its plant to the extent of $10,000. The asphalt plant, connected to the screening plant, was almost entirely destroyed. Cause of the explosion was laid to a spark, which probably occurred when a pug mill paddle struck a stone, and ignited naphtha fumes in the plant.

UNITED STATES GYPSUM CO., Chicago, Ill., has appointed R. E. Kramig & Co., Cincinnati, Ohio, insulation specialists, distributors and agents for its sound control products.

Estimation of

Part I — PHASE COMPOSITION OF

In the System $3CaO.SiO_2$-$2CaO.SiO_2$-$3CaO.Al_2O_3$ -$4CaO.Al_2O_3.Fe_2O_3$ at Clinkering Temperatures

IN A PREVIOUS SERIES of articles in this journal[1] a method was presented for calculating the percentage of liquid and of solid phases in clinker at the temperature of liquid formation. This method was presented particularly with reference to the ternary system CaO-Al_2O_3-SiO_2, because at that time the quaternary system CaO-Al_2O_3-SiO_2-Fe_2O_3 had not been investigated. It was shown that if liquid remains in an under-cooled state, that is, as a glassy phase, in the cooled clinker, the proportions of crystalline phases may be quite different from the proportions calculated on the assumption that crystalline equilibrium is attained.

Since publication of the paper, an investigation of the quaternary system CaO-Al_2O_3-SiO_2-Fe_2O_3 has been reported by Lea and Parker[2] and these investigators have also published a paper on the application of the results of this investigation to cement technology.[3] In the latter paper attention is again called to the possibility that equilibrium crystallization may not be attained, and that the presence of glass may alter materially the phase composition of clinker. The authors point out another possibility, the occurrence of independent crystallization, as a factor in the problem of cement constitution.

When clinker is cooled from its maximum temperature too rapidly for normal crystallization to occur, some or all of the liquid hardens to a glass. The cooled product obtained under these conditions does not have the phase composition calculated on the assumption of complete crystallization, but has the solid phases present in the proportions in which they existed before cooling, or in some intermediate proportions. A knowledge of the possible influence of glass upon phase composition can therefore be secured only by a study of phase composition at temperatures at which a liquid phase is present, that is, at clinkering temperatures.

In a ternary system the percentages of solid phases and liquid formed in any given mixture at any specified temperature may be estimated by graphic methods. In systems of a greater number of components, such as the quaternary system investigated by Lea and Parker, graphic methods are inconvenient. It is consequently necessary to employ calculations, or a combination of graphic methods and computation. In view of the fact that phase equilibria investigations have proceeded beyond systems of three components, it is appropriate at this time to discuss the principles involved in calculating phase composition at temperatures at or above the temperature of liquid formation, and to illustrate their application to portland cement compositions in systems investigated up to the present time.

Table 1 and Fig. 7 (to be published later), which refer to the ternary system CaO-Al_2O_3-SiO_2, are obtained from the report of the investigation of that system by Rankin and Wright.[4] Tables 2 and 3, and Fig. 10, which refer to the quaternary system CaO-Al_2O_3-SiO_2-Fe_2O_3, are obtained from the report of the investigation by Lea and Parker.[2,3]

Since the calculations in this paper are based entirely upon data obtained in investigations of the system CaO-Al_2O_3-SiO_2-Fe_2O_3, as mentioned above, it follows that they apply to portland cement clinker only when other oxides are known to be absent. Furthermore, they are subject to such modification as may be required as a result of further investigation of the quaternary system. Suggestions will be made concerning application of the calculations to commercial portland cement clinker in which magnesia, titania, alkalies, and other minor constituents are commonly present. It should be understood that any disposition which may be made of these oxides is a mere makeshift, intended to bridge the gap between our present state of knowledge of the quaternary system and knowledge of the complete system, which may not be available for many years to come. Until that knowledge is available, calculations involving such disposition of the minor constituents should be made with reservations as to the validity of the assumptions employed.

Principles in the Calculation of Phase Composition

The general principles which are applied in calculating phase composition in systems involving a liquid and pure solid phases are few and simple. Difficulties which arise in their application to specific problems originate in the data employed in the calculations, as obtained in phase equilibria investigations. To demonstrate the simplicity of these principles, they will be presented before considering their application to the ternary and quaternary systems.

Let us suppose that a mixture M partially fuses at some particular temperature, through formation of a liquid L. The mixture is composed of four solid substances, A, B, C, and D. The compositions of M and L are given below:

	Mixture M—%	Liquid L—%
A	40	25
B	30	15
C	20	50
D	10	10
	100	100

As fusion occurs, through formation of liquid L, the percentages of A, B, C and D in solid form are reduced in proportion to the percentages of these substances in the liquid. If m is the fractional proportion of liquid at any stage in the process of fusion, the percentages of A, B, C, and D remaining as solids may be calculated by the equations:

$$\text{Solid } A = 40 - 25m$$
$$\text{Solid } B = 30 - 15m$$
$$\text{Solid } C = 20 - 50m$$
$$\text{Solid } D = 10 - 10m$$

The mixture contains only 20% C, and yet C is being dissolved more rapidly than the other constituents. When $m = 0.40$, solid C has disappeared, since $20 - 50 \times 0.40 = 0$. No more liquid L can form, since C is necessary to its formation. Fusion therefore ceases when $m = 0.40$, and the system is then in a state of equilibrium. The percentages of solid phases at equilibrium may be calculated by substituting 0.40 for m in the equations; obtaining $A = 30$, $B = 24$, $D = 6$. The percentage of liquid is 100×0.40, or 40.

In this particular example, it is determined by inspection that C is the solid phase which disappears when equilibrium is attained. The phase which disappears cannot always be determined by mere inspection, and a method must be devised for determining the disap-

CEMENT CLINKER

By L. A. DAHL
Research Chemist, Portland Cement Association, Chicago, Ill.

pearing phase. This determination may be made by equating each of the right-hand members of the equations to zero, and solving for m, as follows:

$40 - 25m = 0 \quad m = 40/25 = 1.60$
$30 - 15m = 0 \quad m = 30/15 = 2.00$
$20 - 50m = 0 \quad m = 20/50 = 0.40$
$10 - 10m = 0 \quad m = 10/10 = 1.00$

The smallest value of m so obtained, in this case 0.40, is the value of m at which a solid phase disappears, and it is consequently the value to be assigned to m in calculating phase composition at equilibrium. The fact that this value is obtained in the equation for *C* indicates that *C* is the disappearing solid phase.

It may be noted here that m cannot be greater than 1.00, since this represents 100% liquid. It is therefore unnecessary to solve an equation for m when it can be determined by mere inspection that the equation gives a value equal to or greater than 1.00. In the example given, only the third equation gives a value for m less than 1.00. It was consequently possible to select this equation by inspection, instead of following the procedure just described.

It will be observed in this example that the fractional proportion of liquid is equal to 20/50, that is, the percent of *C* in the mixture divided by the percent of *C* in the liquid. The percentages of *C* in mixture and liquid are used in this calculation because *C* is the disappearing phase. If *B* were the disappearing phase, the percentages of *B* in mixture and liquid would be used in the calculation. If two or more phases should disappear simultaneously, that is, when m has some definite value, the same method of calculating the fractional proportion of liquid may be employed. The general principle may be stated as follows:

1. When a state of equilibrium is attained in which a liquid and one or more solid phases are present, the fractional proportion of liquid is equal to the percent of any disappearing phase in the total composition divided by the percentage of that phase in the composition of the liquid.

A corollary principle may be stated as follows:

2. When a state of equilibrium is attained in which a liquid and one or more solid phases are present, the fractional proportion of liquid is equal to the sum of the percentages of the disappearing phases in the total composition divided by the sum of the percentages of those phases in the composition of the liquid.

The example used in demonstrating these principles is of the type encountered in calculating phase composition when a maximum proportion of liquid is present at the temperature of liquid formation. At higher temperatures the liquids which are present are usually capable of existing in equilibrium with only a limited number of phases, sometimes only one. In such cases there is more than one disappearing phase. To demonstrate the conditions when more than one phase disappears, it will be assumed that a mixture and liquid have the following compositions:

	Mixture *M*—%	Liquid *L*—%
A	85	25
B	3	15
C	10	50
D	2	10
	100	100

Applying the method used in the previous example,

Solid $A = 85 - 25m$
Solid $B = 3 - 15m \quad m = 3/15 = 0.20$
Solid $C = 10 - 50m \quad m = 10/50 = 0.20$
Solid $D = 2 - 10m \quad m = 2/10 = 0.20$

It will be observed that each of the three equations, for *B*, *C* and *D*, yield the same value, 0.20, for m. That is, when 20% of liquid *L* is formed, the solid phases *B*, *C* and *D* are dissolved, and only solid *A* remains with the liquid. Identical values for m are obtained because *B*, *C* and *D* are in the same relative proportions in mixture *M* and liquid *L*. This illustrates the following principle.

3. When two or more solid phases disappear, the disappearing phases are in the same relative proportions in the total composition and in the composition of the liquid.

In the examples which have been used to demonstrate the foregoing principles, the mixtures have been assumed to be composed of the hypothetical solid phases *A*, *B*, *C* and *D*, and the composition of the liquid has been expressed in terms of the same substances. This is a procedure which may be followed in any case in which the solid phases present with liquid at equilibrium were also present in the original mixture. When chemical reactions occur during the process of partial fusion, as in clinkering portland cement raw mixtures, the compositions should not be expressed in terms of solid phases present in the original mixture, but in terms of other substances in the system, which must include the solid phases which phase equilibria studies indicate may be present when equilibrium is attained. This will be illustrated by a specific example.

Lea and Parker have shown that at 1338 deg. C. the temperature of liquid formation of portland cement compositions in the system CaO-Al_2O_3-SiO_2-Fe_2O_3, the liquid has the composition 54.8 percent CaO, 22.7 percent Al_2O_3, 6.0 percent SiO_2, 16.5 percent Fe_2O_3, and is capable of existing at equilibrium with solid C_3S, C_2S, C_3A and C_4AF.* Taking a mixture of the composition 67 percent CaO, 8 percent Al_2O_3, 21 percent SiO_2, 4 percent Fe_2O_3 as an example, the phase composition at 1338 deg. C. will be calculated. When equilibrium is attained, the solid phases

*Throughout this paper the chemical formulas of compounds composed of CaO, Al_2O_3, SiO_2 and Fe_2O_3 will be abbreviated by designating these oxides as C, A, S and F respectively. For example, $C_3S = 3CaO.SiO_2$, $C_4AF = 4CaO.Al_2O_3.Fe_2O_3$, etc.

Chemists' Corner

FOR THE NEXT SEVERAL ISSUES Mr. Dahl will explain the estimation of phase composition of clinker in the system $3CaO.SiO_2$—$2CaO.SiO_2$ — $3CaO.Al_2O_3$ — $4CaO.Al_2O_3.Fe_2O_3$ at clinkering temperatures. It is not going to be easy reading, but no one can any longer have an expert knowledge of portland cement composition without an understanding of these phase relationships.

The author is already well known to our readers. His series of articles in 1932 have become classic in cement literature, referred to by all subsequent investigators. The present series is no less important; and we believe much more understandable by those who can not qualify as expert physical chemists.

It would be helpful to all if readers ask questions as the series unfolds.

—The Editor.

present may be one or more of the four phases capable of existing in equilibrium with the liquid. The first step, therefore, is to transform the compositions of mixture and liquid into another form in which they are expressed in percentages of C_3S, C_2S, C_3A and C_4AF, as given below.

	Mixture—%	Liquid—%
C_3S	53.6	1.4
C_2S	19.8	16.2
C_3A	14.4	32.2
C_4AF	12.2	50.2

The percentages of the solid phases are expressed in the following equations:

Solid $C_3S = 53.6 - 1.4m$
Solid $C_2S = 19.8 - 16.2m$
Solid $C_3A = 14.4 - 32.2m$ $\quad m = 0.447$
Solid $C_4AF = 12.2 - 50.2m$ $\quad m = 0.243$

Since 0.243 is the lowest value obtained for m, this value is substituted in the equations, obtaining the following phase composition when the mixture attains equilibrium at 1338 deg. C.

	Percent
C_3S	53.3
C_2S	15.9
C_3A	6.6
C_4AF	0.0
Liquid	24.3

The principle applied in this example may be expressed as follows:

(4) As a preliminary step in the computation of phase composition, the compositions of mixture and liquid should be expressed in terms of substances equal in number to the component-number of the system, and these should include those substances which are capable of existing as solid phases in equilibrium with the liquid.

The composition of mixture and liquid must involve the same number of components as the component-number of the system. For example, if a mixture under consideration is in the quaternary system CaO-Al_2O_3-SiO_2-Fe_2O_3, the compositions of mixture and liquid must be defined in terms of four components. From the latter part of the statement of principle (4), it is necessary to include in these four components the substances capable of existing as solid phases in equilibrium with the liquid. This requirement was met in the foregoing example, in which four substances were capable of existing in equilibrium with the liquid.

In many instances, the number of substances capable of existing in equilibrium with a liquid is less than the component-number of the system. For example, in the quaternary system CaO-Al_2O_3-SiO_2-Fe_2O_3, there are liquids which can exist in equilibrium with solid CaO, and with no other solid phases. From principle (4) it is known that before proceeding with the estimation of phase composition the compositions of mixture and liquid must be expressed in terms of four substances, and that one of these must be CaO. This requirement is met by the oxide composition itself, or, for example, by composition expressed in percentages of CaO, C_2S, C_3A and C_4AF.

In applying principle (4), it will frequently be necessary to express compositions in terms of substances which include those capable of existing as solid phases in equilibrium with the particular liquid or liquids under consideration. Equations for transformation of oxide compositions to the systems C_3S-C_2S-C_3A-C_4AF, CaO-C_3S-C_3A-C_4AF and C_2S-C_3A-C_5A_3-C_4AF are sufficient for all problems of this type encountered in the study of portland cement compositions in the ternary and quaternary systems under consideration. These equations, derived by a method previously described by the author (1), are given below.

Series 1. System C_3S-C_2S-C_3A-C_4AF

$C_3S = 4.0710\ CaO - 7.6024\ SiO_2 - 1.4297\ Fe_2O_3 - 6.7187\ Al_2O_3$ .....(1)

$C_2S = 8.6024\ SiO_2 + 1.0785\ Fe_2O_3 + 5.0683\ Al_2O_3 - 3.0710\ CaO$ .....(2)

$= 2.8675\ SiO_2 - 0.7544\ C_3S$.....(3)

$C_3A = 2.6504\ Al_2O_3 - 1.6920\ Fe_2O_3$...(4)

$C_4AF = 3.0432\ Fe_2O_3$ .....(5)

Series 2. System CaO-C_3S-C_3A-C_4AF

$CaO = CaO - 2.8012\ SiO_2 - 0.3512\ Fe_2O_3 - 1.6504\ Al_2O_3$ .....(6)

$C_3S = 3.8012\ SiO_2$ .....(7)

$C_3A = 2.6504\ Al_2O_3 - 1.6920\ Fe_2O_3$...(8)

$C_4AF = 3.0432\ Fe_2O_3$ .....(9)

Series 3. System C_2S-C_3A-C_2A_3-C_4AF

$C_2S = 2.8675\ SiO_2$.....(10)

$C_3A = 3.6133\ CaO - 6.7478\ SiO_2 - 3.3130\ Al_2O_3 - 2.9610\ Fe_2O_3$ .....(11)

$C_3A_3 = 4.8803\ SiO_2 + 4.3130\ Al_2O_3 + 0.9178\ Fe_2O_3 - 2.6133\ CaO$ .....(12)

$C_4AF = 3.0432\ Fe_2O_3$ .....(13)

The chemical symbols in the left-hand members of these equations refer to percentages of the indicated components in the transformed compositions. With the exception of the C_3S term in equation (3), the symbols in the right-hand member refer to percentages in the oxide composition. Equation (6), for example, indicates that the percent of CaO in the transformed composition is equal to the percent of CaO in the oxide composition, minus 2.8012 times the percent of SiO_2, etc.

Equation (3) is given as a short-cut for calculating the percent of C_2S when the percent of C_3S has already been calculated.

When the terms involving C_4AF and Fe_2O_3 are eliminated, the equations apply to the ternary system CaO-Al_2O_3-SiO_2, since for all compositions in this system, $Fe_2O_3 = 0$. It is consequently unnecessary to state equations for the ternary system separately.

(To be continued)

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2 Lea, F. M., and T. W. Parker. Investigations on a Portion of the Quaternary System CaO-Al_2O_3-SiO_2-Fe_2O_3. The Quaternary System $CaO - 3CaO.SiO_2 - 5CaO.Al_2O_3 - 4CaO.Al_2O_3.Fe_2O_3$. Phil. Trans. Royal Soc., 1934, Series A, 234 (731), 1-41.

3 Lea, F. M., & T. W. Parker. The Quaternary System CaO-Al_2O_3-SiO_2-Fe_2O_3 in Relation to Cement Technology. Build. Res. Tech. Paper No. 16.

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Improve Clinker Cooling

(Continued from page 44)

is built with a divided air box and a swinging gate located near the center of the grate above the clinker bed. In this case the preheated air from the upper half of the grate is delivered to the kiln, while the air from the lower half is delivered to the atmosphere. A single unit of this construction accomplishes the same results as the two-stage units at the Valley Forge plant.

However, the use of separate primary and secondary units provides a slightly better control of the final discharge temperature of the clinker than is possible on a single unit, as it is possible to regulate the thickness of the bed and the speed of the secondary unit to obtain final cooling irrespective of the temperature delivered to it by the primary or quenching unit.

A continuous single grate is now being designed by the Fuller Co. in which the upper half of the grates can be operated at one speed, while the lower half can be operated at a slower speed or shorter stroke, and it is hoped with this design to have the same flexibility as is possible with two separate units.

J. A. Eck and Sons, Inc., Montoursville, Penn., has announced that it will build a steel and concrete structure to replace the sand and gravel plant seriously damaged by fire. The fire, which destroyed the conveyor system, did not reach the crusher building. It is reported that two Diesel motors, machinery, and large quantities of fuel oil were destroyed.

West Virginia Sand and Gravel Co., Charleston, W. Va., has completed the construction of a new supply depot on the Elk river with a storage capacity for 24,000 sacks of cement. The depot was built to take advantage of barge shipments which are now possible due to the construction of larger locks and dams in both the Kanawha and Ohio rivers.

Second Article of Series on Economical Utilization of

WOOD AS A LIME KILN FUEL

By VICTOR J. AZBE
Consulting Engineer, St. Louis, Mo.

ANY WOOD SUBSTANCE, for a given weight, dry and non-resinous, will produce close to the same amount of heat. However, wood as fired may vary in moisture and in resinous content which will change the heat content per lb. considerably. Another factor is that wood is not ordinarily used by the weight but rather by cord estimate, and the weight of a cord varies, depending on moisture content, specific gravity, size and shape, and the manner of piling of the component pieces of the cord. A cord is 8- x 4- x 4-ft. or 128 cu. ft., but it is a good cord, indeed, that will contain 90 cu. ft. of wood and it may contain as little as fifty.

Variations are so manifold that it would seem impossible to rationalize them to some sort of standard of performance for a comparison of results obtained in different plants. However, it is possible and, while data to be given may not be absolutely accurate for the different conditions, wood plants are so startlingly inefficient that even if we are off in our estimates as much as 10 percent or even 15 percent, the data will still be usable and will show the great possibilities for improvement.

Most useful is Table II giving, in the first five columns, the gross calorific value in millions of B.t.u. for a 90 cu. ft. cord of various woods, air dried to a state of 20 percent water content. As stated before, 90 cu. ft. of solids in 123 cu. ft. of volume, or 70 percent filling of space constitutes a very good cord, and it constitutes large sticks not less than 6 in. at the small end, large splits or heavy slabs. If the cord is not of such composition, the heat value must be revised to probably 80 cu. ft. or even 70 cu. ft. per cord, but that would be a poor cord.

LIME FORUM

Mr. Azbe is a contributing and consulting Editor of ROCK PRODUCTS. He will be glad to receive inquiries from his readers, and will answer these direct or through the columns of this Forum.

In dealing with wood, the user must adapt his calculations to conditions because there may be regional variations affecting weight of wood and its heat value, and there are even great differences from the same tree. Rosins play a considerable part in the calculations, as a wood can contain as much as 50 percent rosin, with a heat value of about 17,000 B.t.u. per lb., which would make possible great discrepancies.

If the cord does not weigh the same as shown in column 2, Table II, and is well air-dried so weight of water is not responsible for the difference, then the heat values should be proportionally changed either up or down, but generally it will be down.

Column 6, Table II, gives the maximum tons of lime per cord of wood for both high calcium and dolomitic lime. The figures are arrived at by the method demonstrated in Table I. The ratios are surprisingly high. However, high as they are, only heat that could be utilized for the actual dissociation is counted on, sensible heat too low in elevation and latent heat of water vapor are not considered. Efficiency should be based on that which is actually possible, under a theoretical ideal, and not on something that through force of circumstances is even theoretically impossible. For example, the latent heat of water vapor and the sensible heat of gases below temperature of dissociation is heat; it was in the fuel and is passing up the kiln, but it could not possibly enter the process of dissociation. That this is true is neither the fault of the kiln nor the fireman, so why blame it on them.

Actual Plant Performance

Table III gives actual performance data of seven wood-fired plants. In the lowest line is given the practical operating efficiency. It ranges from 10 percent to 74.0 percent. The plant with the lowest efficiency burned the highest

TABLE II—VARIOUS WOODS, THEIR WEIGHT, HEAT VALUES AND MAXIMUM POSSIBLE TONS OF LIME PER CORD*

COLUMN	Weight per cu. ft. air dried 20% water lb.	Weight per cord air dried 90 cu. ft.	Basic heat value dry B.t.u. one lb.	Heat value 20% water per lb.	Heat value per cord gross cu. ft.	Maximum ratio tons lime/cord wood high calc.	Dolomite
Ash (white)	46	4400	8900	7120	31.30	7.1	9.9
Beech	47	4220	8760	7000	29.4	6.7	9.3
Birch (white)	41	3680	8660	6920	24.8	5.6	7.8
Cedar (white)	23	2070	8400	6720	13.9	3.1	4.4
Cypress	31	2780	9850	7860	21.8	5.0	6.9
Elm	48	4320	8810	7040	30.4	6.9	9.6
Fir (Douglas)	40	3650	9000	7180	26.2	6.0	9.3
Hemlock	27	2430	9700	7750	18.8	4.3	5.9
Hickory (Shelback)	62	5600	8680	6940	38.8	8.9	12.2
Maple	48	4320	9140	7300	31.5	7.2	9.9
Oak (black)	46	4140	8180	6540	27.0	6.1	8.5
Oak (red)	49	5410	8670	6920	37.4	8.5	11.8
Oak (white)	52	4680	8820	7040	32.9	7.5	10.4
Pine (pitch)	39	3510	11350	9080	31.8	7.2	10.0
Pine (white)	20	2610	8880	7080	18.4	4.2	5.8
Pine (yellow)	31	2790	9600	7680	21.4	4.8	6.7
Poplar	31	2790	8920	7130	10.7	4.5	6.2
Spruce	29	2610	8700	6950	18.1	4.1	5.7
Tamarack	38	3420	8780	7020	24.0	5.5	7.6

*For the above figures to apply, the cord must be well air-dried and weigh the amount specified. If weight is less, reduce gross heat value and lime—fuel ratios in proportion.

TABLE I

THEORETICAL RESULTS OF CALCULATIONS FOR DETERMINING HEAT AVAILABLE IN WOOD FOR CALCINATION OF HIGH CALCIUM AND DOLOMITIC STONE

(OAK WOOD)	High Calcium	Dolomite
Heat in wood per lb., dry	8400	8400
Heat in wood per lb. with 20% moisture	6723	6723
CO_2 in products of combustion	1.46	1.46
Nitrogen in products of combustion	6.00	6.00
Free water, combined water, water from combustion of hydrogen	.63	.63
Junction temperature between calcining and preheating zones	1525	1330
Sensible heat loss at junction temperature carbon dioxide	584	482
Sensible heat loss at junction temperature nitrogen	1895	1500
Sensible heat loss at junction temperature water vapor	542	453
Total of sensible heat lost at 1525° F. B.t.u.	3021	2435
Latent heat loss due to water vapor B.t.u.	609	609
Total heat escaping from calcining section per lb. wood B.t.u.	3630	3044
Heat remaining for utilization B.t.u.	3093	3679
Percent of heat in wood available for calcination	46%	55%
Heat of dissociation per lb. of lime	1378	1313
Sensible heat in one pound lime at 1648° F. returned by cooler	378	440
Make up heat necessary for dissociation/lb. lime	1000	863
Maximum possible pound of lime per lb. of wood	3.09	4.26
Weight of one cord of 20 moisture oak wood lb	3670	3670
Theoretical maximum possible tons lime per cord wood	5.65	7.8
Maximum ratio if lime leaves at 1648° F. and cooler does not function	4.1	5.1
Maximum ratio if lime leaves at 2200 deg. F. and cooler does not function	3.83	4.8
Beneficial effect of cooler if lime leaves at 2200 deg. F.	33%	38%

heat value fuel while the plant of highest efficiency had the lowest grade fuel of the entire seven plants. This seems strange, but it is not as the poor plant had pitch pine as fuel and kilns were neither properly arranged nor properly fired to obtain complete combustion, therefore, the loss was very high. The hot zone was full of cobwebs; that is, soot stringers. They would not have been there if there was ample air, but the kilns were fired so heavily that the excess gas distilled from wood crowded out the air necessary for proper combustion.

In spite of poor wood fuel, the Moosehorn kiln has a higher operating efficiency than any other wood-fired plant. This favorable result was made possible because the kiln arrangement is such that even poor wood gives exceptional results. Years ago when attempts were made to make lime in this same plant with the same wood no lime could be obtained from the kilns to speak of, but then both arrangement and procedure were wrong and probably simulated the Oregon conditions. The Moosehorn plant is a wonderful example of what is possible, but even these conditions can be improved and a practical operating efficiency of 90 percent should be attainable for which we later will lay out the method.

In this table, we bring out fully the performance difference between high calcium and dolomite. Efficiency at Lee, Mass., is very poor, if both nature of stone as well as quality of wood is considered. It is true that they make 2.8 tons of lime per cord and Moosehorn only a little more; that is, three tons per cord, but bringing it all to a common basis, Lee's ratio should be 6.7 tons of lime per cord to equal Moosehorn. To consider this high ratio as attainable would seem foolish if it was not known how the heat is wasted and how it can be saved and usefully utilized. In addition we have the Moosehorn example, and to strengthen the contention still more, the knowledge that even Moosehorn performance can be bettered.

Many plants turned from wood to coal as wood was four to five dollars per cord and fuel cost per ton of lime two dollars and sometimes more. Now we find that even with costly firewood, fuel cost per ton of lime would have been one dollar or even less.

A REVOLUTIONARY lime composition for the buffing industry, called Wax-Pak Li-Vac, is announced by Bruco Products, 5712 12th St., Detroit. Great savings in operating time and material are claimed, thereby lowering production costs. Product is packed in waxed paper, a new innovation. It is vacuumized, compressed and formed in one operation at a constant temperature, thus producing a denser, more adhesive, and efficient composition. Another advantage is that it can be used without unwrapping.

SOUTHWESTERN PORTLAND CEMENT CO., Los Angeles, Calif., not only believes in safety as applied to workers in its cement plants but also has striven to promote safety in the home and on the highway. A series of numbered cards have been printed entitled, "SAFETY COLUMN," with a safety message which commands attention as there is a story in each one that carries the point across.

INTERIOR OPERATING CO., Penticton, Wash., is building a plant at the old Granby mine site, Grand Forks, B. C., Canada, to manufacture mineral wool from the old smelter slag pile, said to contain 5,000,000 tons.

TABLE III—PERFORMANCE OF WOOD FIRED KILNS.

Plant	Spring, Missouri	Roche Harbor, Washington	Oregon	Moosehorn, Manitoba	Lee, Mass.	Stonewall, Manitoba	Cordoba, Argentina
Nature of Lime	High Calc.	High Calc.	High Calc.	High Calc.	High Calc.	High Calc.	High Calc.
Nature of Wood	Oak split	Douglas Fir	pitch pine	spruce Billet	hard maple Firewood	poplar	algarrobo
Kind of Cord and Weight in lb.	firewood cord 3670	3650	3500	2600	Cord 3900		
Heat value/lb. 20% moisture	6670	7200	9080	6820	7300	7130	6500
Total heat in one cord millions B.t.u.	24.4	26.3	31.8	17.7	28.5	20.0	
Percent of heat available for calcination in kiln with functioning cooler	46%	46%	46%	46%	55%	55%	46%
Heat available for calcination in millions of B.t.u.	11.2	12.2	14.6	8.1	15.6	10.5	
Maximum possible tons of lime per cord	5.5	6.0	7.2	4.0	9.0	6.3	
Actual tons of lime obtained per cord	2.4	2.7	.7	3.0	2.8	2.5	one ton of lime/ton wood
Practical operating efficiency based on available heat	43.7%	45%	10%	74%	31%	40%	33%

Huron Eliminates Dust In

BAG HOUSE AND BULK LOADING

ONE OF THE MOST PUZZLING good housekeeping problems in cement plants is the reduction of dust in the bag house. The Huron Portland Cement Co., Detroit, Mich., has made effective use of an ingenious table top exhaust which quickly catches any dust from the bags before it has a chance to escape into the room. This keeps the air clear, and contributes much both to the appearance of the room and the comfort and efficiency of the workers.

Dustless Sorting

The accompanying illustrations show how this has been accomplished. The preliminary sorting tables at the intake end of the bag cleaner, Fig. 1, are 30-in. high and the tops are 54- x 58-in. In place of each table top, a perforated plate containing about 4,000 holes has been placed.

The perforated top is connected to a hopper and down draft exhaust leading to a dust collector on the floor below. The exhaust has a velocity at the table top of 300 to 400-ft. per minute which, of course, is increased when bags cover some of the holes. Similar tables (Fig. 2) are placed at the discharge end of the bag cleaner where a second sorting and counting is done.

In the bag repair room, the sewing machines are equipped with a similar perforated top, Fig. 3, in the area on which the bag rests while being sewed. In front of this grating is a narrow slot, just under the table top, which draws a continuous curtain of fresh air past the operator's face.

The resulting improvement in good housekeeping has been followed by a notable increase in worker efficiency and comfort.

Simple Device Prevents Loss in Bulk Loading

Figs. 4 and 5 show how Huron engineers have prevented loss of cement during loading of bulk cars.

An 8-in. lightweight, flexible suction hose, weighing 3 lb. per foot, of a type used by furnace cleaning contractors, has been found to stand up satisfactorily under severe usage. This hose is connected to the dust collector in the pack house. When box cars are being loaded, the suction hose is inserted in the opposite door to draw out the air. This provides a gentle indraft (about 150 ft. per minute) on the loading side, which prevents escape of dust. When hopper cars are used, the suction pipe is simply dropped into a hatchway that is not being used for loading. The photographs were taken when the cars were being loaded at the rate of 425 bbl. an hour, without visible dust.

When not in use the suction pipes can be drawn up out of the way by a simple pulley and rope mechanism, Fig. 6, easily handled by one man.

Undoubtedly adaptations of these devices will help many plants to solve their dust control problems in the bag house and at the loading platform. The Huron Company should be highly commended for its courtesy in making these dust preventative designs public.

Fig. 1: Sorting incoming bags before going through bag cleaner. Note perforated table top, dust hopper and pipe which pulls all dust away

Fig. 2: Sorting belt at discharge end of bag cleaner

Fig. 3: Down draft through perforations and curtain of air drawn through slot keep the air free of dust

Fig. 4: Cement being loaded into car at the rate of 425 bbl. an hour

Fig. 5: Suction pipe is equally effective for hopper cars

Fig. 6: When not in use, the flexible hose can be withdrawn

HINTS AND HELPS FOR SUPERINTENDENTS

Lining Sand Flumes

TO PREVENT ROTTING out of wood sand flumes, the Columbus Gravel Co., Columbus, Miss., lines the bottom of each flume with ordinary roofing asphalt to a depth of ¼ in.

Heater for melting roofing asphalt made from an old pump shell and locomotive drum

A furnace has been constructed adjacent to the machine shop for the melting down of the roofing asphalt, since each lining is replaced about once every four months. The firebox of the furnace is an old 10-in. pump shell lying flat on the ground, out of which has been cut an opening for inserting firewood and removing ashes.

Part of a 10-in. pipe line is fitted on to the regular discharge outlet of the pump shell as a stack and an old cylindrical dome taken from a steam locomotive contains the asphalt to be melted. This dome is set directly on top of the pump shell and is equipped with a spigot for draining off the liquid asphalt in buckets.

Asphalt is applied by brush to a thickness of ¼ in. when the wood flumes are thoroughly dried out, to prevent peeling. Cost of the asphalt is very low as compared with the cost of rebuilding flumes.

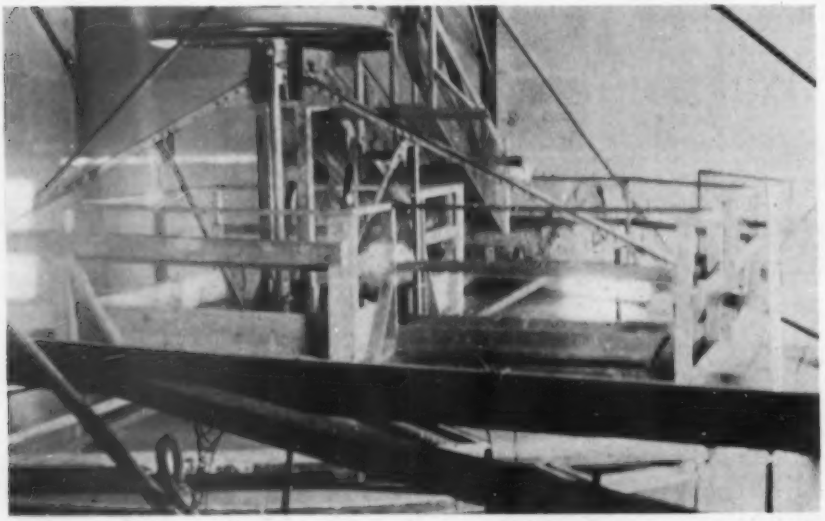
Eliminating Trouble With Thickener

ONE OF THE MOST TROUBLESOME operating features of a Dorr thickener occurs when foreign matter gets into the pulp stream. And gear grease is one of the most consistent troublemakers. Obviously, the bull-gear must be kept well lubricated with a heavy grease, and in putting this material on the gear some wastage always occurs. This gear grease when it falls into the pulp stream congeals into a rope-like mass that grows in size like a rolling snowball until eventually it plugs the bottom outlet of the thickener and then real trouble begins. Oil cans, grease guns, blocks of wood and pipe wrenches are also common troublemakers when they fall into a thickener.

In the illustration, the thickener is shown with a substantial platform built under the bull-gear so the troublemakers can be kept out of the thickener. That portion not covered with the platform is protected by ¾-in. poultry netting so that it is practically impossible for foreign matter to get into the tank.

Another feature in this illustration is the use of a octagon-shaped wooden platform on top of the bull-gear. The platform enables the operator to raise and lower the rakes without endangering himself by becoming entangled in the bull-gear mechanism.

A third feature is the use of an extended arm on the alarm indicator arm. The long arm is provided with a bright red "target" so that the operator can easily see the alarm indicator from all points in the plant. This device simply augments the electric alarm system as the electric alarm often fails at the time needed because of corroded contacts.



Platform covering top and bottom of bull-gear safeguards operator of thickener and prevents objects or grease from falling into the pulp stream

Portable Bag Packer

DOLCITO QUARRY CO., Birmingham, Ala., operates a two-spout Bates bagging machine for packing 100 lb. of finely pulverized dolomite in paper sacks.

It is not necessary to have more than one machine since much of the fine product is shipped in bulk. Accordingly, four small wheels were installed on the machine and it is used alternately between the two bins. For rigidity when in place, four automobile jacks are used to hold the machine. A complete change is made from one bin to the other in 30 minutes.

How Do You Buy Motor Brushes?

By I. W. BRANDEL*

WHEN ORDERING REGULAR REPLACEMENTS for the carbon brushes on motors and generators in the plant, the process is simple enough if the machines are performing satisfactorily. "Same as last time" will do the trick. Now and again, however, you may find yourself up against a serious brush problem. The brushes on a certain machine may persistently spark, heat and wear; and nothing you can do seems to have any effect. How do you buy brushes then?

The "best" brush for all conditions simply doesn't exist; though each grade of brush is best for certain conditions. The fact that a brush is giving fine results in some neighbor's plant doesn't

mean a thing unless you know that your own conditions are the same. Let us see why this is so. Not only do many motor and generator requirements differ according to make, rating and speed, but even the needs of individual machines of the same make may vary somewhat according to manufacturing variations and to local conditions, (moisture, dirt and heat), under which they must operate. Types differ in the number of commutator bars, width of bars, turns per coil, field intensity, etc. Then remember that there are dozens of brush grades, each differing from the others in contact drop, specific resistance, peripheral speed limitations, friction, abrasiveness, hardness, etc., and you can easily judge how much chance any brush has of being a "cure-all".

Coöperation Does the Trick

When in doubt as to whether the brush grade should be changed, why not ask the brush manufacturer to coöperate with you to find out what is wrong? He will gladly do so, and his engineer will make a thorough examination of the "patient". He may find, as is often the case, that the fault is not with the brushes at all, but is due to some obscure trouble in the armature, field or bearings; for brush troubles are frequently a symptom of something else. If this is not the case, he will recommend some different grade whose physical and electrical characteristics are more nearly in keeping with your special conditions.

Overloads, either continuous or intermittent, may suggest the substitution of graphite for carbon-graphite material; dusty or excessively hot location of the machine may point to the use of a more abrasive brush so as to keep the commutator or slip-ring surface cleaner and better polished; mechanical shocks or vibration may indicate a harder and tougher brush; high voltage drop per commutator bar may require a higher contact drop between brush and commutator to overcome it.

Any or all these causes may be present, and they are likely to interact with each other besides. So give the brush engineer a fair chance. He isn't infallible, but neither does he merely "guess". But if, for instance, you have been using up sets of brushes every three or four weeks, his first attempt may easily extend the length of service to as many months. From what you tell him of the results, his next recommendation may completely solve the problem.

He will probably tell you, "I am fairly sure that these brushes I recommend will do the job. I may be wrong, of course, but I am sufficiently confident about it to tell you that you won't have to pay a cent unless they considerably improve the present conditions. Next time I can do even better—probably I can get rid of the trouble entirely."

But why make your machine a "guinea pig"? Because 90 percent of the time you will get quicker results at less cost than you would by buying brushes on the basis of patent medicines or numbers in a raffle.

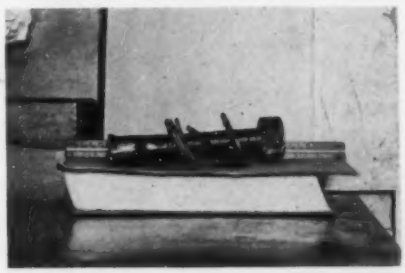
* Sales manager, The Ohio Carbon Co.

Ball Mill Gaskets

By WALTER B. LENHART

Bishop Creek, Calif.

GASKETS ON BALL MILL liner bolts quickly become useless due to the service to which they are subjected. The great pressure exerted causes the gaskets to squeeze out from under the metal washer, and in a short time leaks develop.



Showing how ball mill gaskets are assembled on liner bolts

Some mills use gaskets cut from old rubber belting and these, while cheap in first cost, are a poor investment. Some satisfactory gaskets can be purchased, but they usually are expensive and if carried in stock for an emergency usually are not on hand when wanted.

A very satisfactory gasket assembly can be made by first cutting a ring 3/16-in. high from a piece of double extra heavy 2½-in. or 3-in. pipe. Three ⅛-in. thick rubber gaskets are then cut so as to fit over the liner bolt and to fit *inside* the metal ring.

In practice then the liner bolt is placed in position, the three rubber gaskets next put in place, and the metal ring put over the rubber gasket. Now an ordinary metal washer is put over the gaskets, and the liner bolt nut put on last.

On tightening the nut, the rubber gaskets are prevented from spreading by the retaining ring and great pressure can be applied. A machinist with a small lathe can make 150 rings in 8 hrs.

Such a method of installing liner bolts will usually outlast a set of liners and with less likelihood of leaks, especially where the pulp can get on the bull gear—leaks on a bull gear are expensive.

In the illustration may be seen the method of applying the ball mill gaskets on the liner bolt.

Moulding Sand Preparation

NORTHERN NEW YORK STATE is noted for its deposits of natural moulding sands. When the deposits are selected the sand is excavated by the simplest means and usually loaded directly into railway cars. The only preparation needed in many instances is to screen out pebbles and coarse sand. Willard J. Dyer, producer, Jonesville, N. Y., has designed and constructed a portable device for doing this.

As illustrated, the truck dumps to a short elevator which feeds a rotary screen. The throughs of the screen feed to a conveyor belt, box-car loader. The capacity is about 30 tons per hour. The two units are portable and, therefore, can be taken to railway car loading tracks. The production of many of these small operations is often not sufficient to justify building railway sidings into the pits.

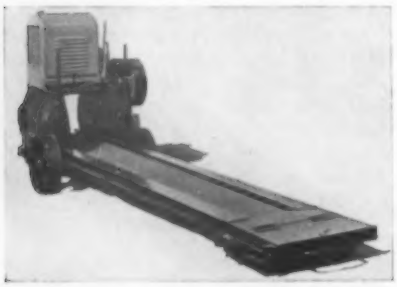
The foregoing may present a means of solving an unusual transportation problem involving shipments of aggregates.

Portable rotary screen and carloader to handle moulding sand directly into railroad cars

New MACHINERY & EQUIPMENT

Car Unloader

ATLAS CONVEYOR CO., Clintonville, Wis., has announced the development of a horizontal style car unloader, known as Model BU-18, designed to



Car unloader placed under hopper cars and laid over rails

operate at minimum power and labor costs. It is claimed that the car unloader will handle coal, crushed stone, sand, and gravel at the rate of 50 to 70 cu. yd. per hour.

As shown in the illustration, the design permits it to be placed under hopper cars and laid across the rails without the necessity of digging into the track ballast for a secure base for the machine.

The car unloader has the following dimensions: length, overall, 13 ft. 9 in.; height, overall without power, 28 in.; width, horizontal section, 21¾ in.; width overall, 33 in.; depth above rail, 3½ in.; trough width, 11 to 15½ in.; belt width, 18 in.

Car unloaders of this type are being used by concrete products manufacturers to unload aggregates and coal. They may also be adaptable as portable tunnel conveyors.

Convertible Shovel of ¾-cu. yd. Capacity

LIMA LOCOMOTIVE WORKS, INC., Shovel and Crane Division, Lima, Ohio, has placed on the market a convertible shovel, dragline, crane and pull-shovel known as the Paymaster, a name given to the new machine by virtue of a contest conducted at the 1938 Road Show. The winner of the contest was announced in the August issue of ROCK PRODUCTS.

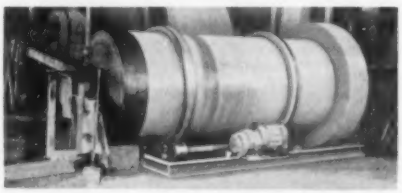
It is a ¾-cu. yd. shovel weighing 35,500 lb. When equipped as a clamshell or dragline, capacity depends upon length of boom and material to be handled. When equipped as a crane, it has an 11-ton capacity. It is fast with ample strength to give steady, dependable service in all kinds of work suited to a machine of ¾-cu. yd. capacity. As a shovel it is equipped with an 18-ft. boom and 15-ft. dipper handle. Standard crane boom is 35 ft, however, inserts can be added to make a 50-ft. boom.

Greater lifting capacities are possible without affecting the weight of the machine by the main machinery being placed to the extreme rear of the revolving frame. The machine revolves arount a pintle cast integral with the base casting. The double flange roller path is also an integral part of the base.

When used as a shovel, convertible unit has an 18-ft. boom and 15-ft. dipper handle

Counter Current Classifier

HARDINGE CO., INC., York, Penn., have made several improvements in their counter current classifier. Capacity has been increased for a given size of classifier volume, by changing the shape of the spiral attached to the drum, with which it rotates, the spiral rolling the sands from the feed end to the oversize or discharge portion. Decreasing the height of the spiral in the settling zone and increasing it at the oversize end, greatly reduces agitation and per-



Counter current classifier in closed circuit with ball mill

mits handling of greater quantities of oversize. Thus increased capacity of both finished product discharged and oversize or sands delivered at the opposite end, is obtained.

A change in the discharge arrangement that delivers the sands from the oversize end has raised the point of discharge nearly a third more than was previously obtained. Consequently, when operating in closed circuit with a ball mill, a scoop feeder of ordinary diameter can be used instead of extra-size scoops formerly required when large circulating loads and high capacities were put through the system.

Diesel-Powered Trucks

THE HUG CO., Highland, Ill., has just completed shipment of four of its large "Caterpillar" Diesel-powered trucks to the Gulf Oil Corp., for Meme Grande Oil Co., Venezuela, South America.

The Model 36 Hug Lugger is a specially designed, heavy-duty dirt and rock moving unit, equipped with a 10 to 12-cu. yd. Boulder Dam type body, having a twin cylinder hydraulic power hoist. Other features of construction include a full Diesel engine, a dual-drive, double-reduction rear axle, a 4-speed unit and 3-speed auxiliary transmission, all-welded I-beam frame, and 11.25 x 24 single front, dual rear ground-grip tires. The body is reinforced with ¼-in. bottom plate and 1¾-in. oak filler, and the

canopy over the driver's seat protects the driver and seat box from falling material.

These units were also equipped with extra equipment consisting of a Tulsa

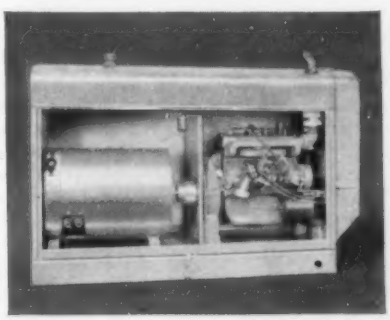
Diesel-powered truck for South America

Model 70 winch, fifth wheel and bolster supports. This optional equipment is interchangeable with the power hoist and body. When the truck is not used with the power hoist body, the body is removed, and the winch and fifth wheel are mounted on the chassis.

Engine-Driven Arc Welder

THE HARNISCHFEGER CORP., Milwaukee, Wis., is now manufacturing a 200-amp., engine-driven welder with a somewhat wider operating range than the average 150-amp. unit.

Consisting of a 200-amp., commercial rated 30-volt 6 kw. generator with an intermittent welding range of 35 am-



Engine-driven arc welder with 200-amp. rating

peres to a maximum of 225 amperes, the generator is connected by a flexible coupling to a 24-hp., 4-cyl., water-cooled gasoline engine. The engine is equipped for hand-starting and with magneto ignition system. Its full tank capacity is 13 gal., crankcase holds 3½ qts. of oil, and the cooling system contains 3¾ gal. of water. The entire unit is mounted on a formed steel base and equipped with a fully enclosing sheet metal canopy having removable sides for easy access to all parts.

Although in its standard form the "Special", as it is called, is a stationary type machine, it can be supplied with the standard two-wheel pneumatic-tire running gear as now used on the 150-amp. portable, engine-driven welder. It is built to handle electrodes up to 7/32 in. in diameter under continuous manual operation.

Crusher With One-Piece Steel Base

UNIVERSAL CRUSHER CO., Cedar Rapids, Iowa, has introduced the new No. 2436 "streamlined" crusher with 24- x 36-in. feed opening.

This crusher has a one-piece alloy

One-piece base reduces crusher weight 20 percent

steel base with a smooth exterior, reinforcement being provided on the inside. This new base construction provides approximately 20 percent saving in weight.

Other features include: the six heavy duty roller bearings, two on the pitman and two on each side, quick acting product size adjustment, and wide feed opening.

After-Welding Cleaning Compound

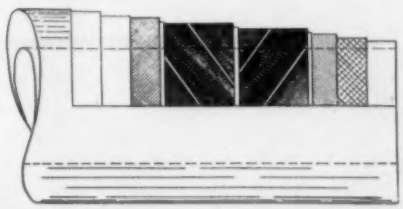
LINCOLN ELECTRIC CO., Cleveland, Ohio, has brought out a compound which is said to reduce cleaning time after welding by 20 to 60 percent.

By reducing the tendency of spatter to adhere tightly, thus facilitating its removal, the cleaning compound makes fabrication by arc welding more economical.

"Spatter Film", as it is called, is soluble in water. It is non-inflammable and contains no free alkali to injure the hands nor harm paint. It is easy to apply by means of an ordinary paint brush. Only sufficient of the film need be applied to cover the work adjacent to the seam or joint. It can be removed readily for painting by wiping with a clean cloth, if still wet, or by washing it off with water if dry.

High Pressure Hose

GOODYEAR TIRE & RUBBER CO., Akron, Ohio, has developed an improved rotary hose, known as style 3154, having a



Hose designed for 1500-lb. working pressure and 7000-lb. burst construction

third bead wire extending back from each end approximately 5 ft. The hose, designed for service within the 1500-lb. working pressure range, is of 7000-lb. burst construction. It will not readily crush or kink, but at the same time is a flexible, high-pressure hose. It has an especially tough compounded rubber tube and the body structure consists of multiple plies of extra heavy cotton duck and two distinct layers of bead wire spiralled in opposite directions. Each layer of wire is imbedded in rubber and carefully insulated from the other by rubber and duck. Cover is of rubber compounded to give maximum resistance to abrasion.

Linestarters

WESTINGHOUSE ELECTRIC & MANUFACTURING CO., East Pittsburgh, Penn., announces that a "De-ion" linestarter for a-c. motors up to 5 hp., 220 volts, and 7½ hp., 440 and 550 volts, is now available in an oversize cabinet providing an unusually large amount of wiring space, and may be used where overall dimensions are not limited to

Linestarter enclosed in cabinet provides ample wiring space

the more compact standard sizes. These starters may be obtained with a separate push button, with a built-in start-stop push button, or with a built-in hand-off-automatic switch.

NATIONAL ASSOCIATION *Activities*

Sand and Gravel

IT IS EXPECTED that within a short time, Elmer F. Andrews, Administrator of the federal wage and hour law, who took office August 15, will issue rules and regulations which will serve to clarify the statute. Executive Secretary V. P. Ahearn of the National Sand and Gravel Association, reports that an open meeting of the executive committee will be called in Washington in order that the industry may adopt an official policy toward any provision in the law which directly or indirectly influences the sand and gravel producer.

Industrial Sand

PREJUDICIAL COMPENSATION insurance rating policies in the State of New York as they affect producers and consumers of the industrial sand industry are being considered by the Research Committee of the National Industrial Sand Association. E. O. Schneider is chairman of this committee. Investigation reveals that the number of silicosis claims and amounts of awards thereunder in New York State have been substantially less than originally anticipated. In arriving at the occupational disease rates when these were first established in 1935, the New York Compensation Insurance Rating Board did not have its own facts on which to predicate the rates. These rates were largely, therefore, judgment rates. The Board, however, used an engineering table, which had as its normal such experiences for the foundry industry as the Board could gather from Canada and Europe and other states.

Crushed Stone

At the July meeting of the New York State Crushed Stone Association, Inc., held at the Syracuse Yacht Club, Syracuse, N. Y., President J. R. Callanan announced the incorporation of the association under the Membership Corporation Law of the State of New York. The officers are J. R. Callanan, president; John Rice, Jr., vice-president; H. E. Coleman, treasurer; and R. R. Litehiser, secretary. Thirty-one members and guests were present at the meeting. Among the guests was Dr. Leonard Greenburg, executive director of the Division of Industrial Hygiene of the New York State Department of Labor, who told about what his division was attempting to do in protecting the health of workers in the matter of dust control.

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Pennsylvania Stone Producers Association, Inc., Harrisburg, Penn., held its annual outing and producers' meeting on August 18 at the Blue Ridge Country Club. Following the business meeting, a buffet luncheon was served. The afternoon was devoted to golf, quoits, casino, etc. A dinner in the evening was followed by a floor show.

Lime

Announcement has been made of the election of Paul H. McMillin, president of Roche Harbor Lime & Cement Co., Roche Harbor, Wash., as a director of the National Lime Association from District 14, to serve during the fiscal year, which began July 1, 1938.

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Members will be pleased to learn that Lee S. Trainor, who suffered a stroke of paralysis in February this year, is showing considerable improvement in his physical condition. He anticipates that he will be able to walk in a few weeks.

American Mining Congress

LOS ANGELES, CALIF., will be host to the American Mining Congress from October 24 to 27. Although a majority of the papers will be principally of concern to the metallic mining industry, some will be of general interest to the rock products industry. Some of these subjects are: Improvements in Crushing and Grinding; The Silicosis Racket; and Labor Relations. The exposition will feature displays of modern mining equipment.

Fall Meeting A.S.M.E.

A symposium on rubber will be sponsored by the Committee on Rubber and Plastics at the fall meeting of the American Society of Mechanical Engineers, to be held at the Providence-Biltmore Hotel, Providence, R. I., October 5 to 7. Included in the program are papers on the following subjects: Synthetic Substances with Rubberlike Properties, by E. R. Bridgwater, E. I. du Pont de Nemours & Co., Wilmington, Dela.; Problems in the Production of Rubber, by E. G. Kimmich, Goodyear Tire and Rubber Co., Akron, Ohio; and The Mechanical Characteristics of Rubber, by F. L. Haushalter, B. F. Goodrich Co., Akron, Ohio.

Name Changed

NATIONAL MINERAL WOOL ASSOCIATION is the new name of the former National Rock and Slag Wool Association. A considerable part of the wool marketed is made of glass, which did not fit into the picture represented by the original name. Wharton Clay, formerly secretary of the National Metal Lath Association, is secretary of the National Mineral Wool Association, with headquarters in New York City.

For Advertising Men

NATIONAL INDUSTRIAL ADVERTISERS ASSOCIATION will hold its 16th annual conference at the Statler Hotel, Cleveland, September 21-23, it has been announced by Stanley A. Knisely, advertising director of the Republic Steel Corporation, who, as vice-president of the association, heads its committee for conference program and arrangements.

N. I. A. A., while relatively youthful among national groups of advertising men, has attracted to itself widespread attention on account of its enthusiasm in seeking to establish, standardize, and improve modern practices in advertising and selling to the industrial markets. Outstanding, also, is the Association's policy of supporting unequivocally the principle of truth in advertising.

Surpassing at the Chicago convention last September all former attendance records with a registration of almost 800, the enthusiasm with which the members have received early conference notices, leads the Cleveland committee to expect—despite the recession—a still larger attendance this year. Prediction of increased attendance is advanced also by President Frank O. Wyse, advertising manager of Bucyrus-Erie Co., South Milwaukee, who characterizes the period since last September as the busiest in the association's history.

THE INSTITUTE OF QUARRYING (Great Britain) will hold its annual conference at Dunblane, Scotland, September 12 to 15. This is the equivalent of our National Crushed Stone Association's annual convention. The program includes golf and many social features.

Concrete Products
Cement Products
TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

Reinforced Concrete Channel Made With Lightweight Aggregate

NEW BUILDING UNIT

As Described by
FRED W. PFEIFER
President, Wisconsin Units Co., Milwaukee, Wis.

A PRE-CAST CONCRETE BUILDING UNIT, especially adapted for the construction of low-cost houses, has been developed in Milwaukee, Wis. Commonly referred to as the "Pfeifer unit," pending registration of a trade name, the unit is the product of years of study and differs in many respects from other units designed for the same purpose. The patent, owned by Fred W. Pfeifer, is being developed and promoted by Building Units Corp., Milwaukee. This company, as the parent concern, has licensed the Wisconsin Units Co. to manufacture and sell the product in the Milwaukee area, and they are now in full production.

The "Pfeifer unit" is a reinforced concrete channel made with lightweight aggregate. In constructing walls the units are bolted together, and in laying floors and roofs the identical units are bolted to lightweight steel joists. Since the first of the year over 6000 of the units have been sold in Milwaukee and surrounding territory for the construction of homes, taverns, and filling stations, and for floors in industrial buildings.

Having all the advantages of lightweight concrete, including lightness in weight, resistance to penetration by moisture and the invasion of termites, the new unit also provides a vertical rib-type of exterior wall with a dead air space in which insulation may be placed, if so desired.

It was the aim of Mr. Pfeifer to perfect a unit that has sufficient flexibility to allow full expression of individuality on the part of the architect and one which lends itself to any style or design. Cost of a completed fire-safe home built with "Pfeifer units" is claimed to compare favorably with that for a complete frame house, because of the speed in laying up and reduced labor costs. The unit can be handled readily by one man and erected rapidly by men with reasonable building experience. Both masons and carpenters have been found highly efficient in the erection of these units.

"Pfeifer units" are made in 24- x 24-in., 12- x 24-in., and 12- x 12-in. sizes, most of them being the largest size. Each unit has two flanges, 4-in. in depth on opposite sides, as shown in the acompanying detail drawing and illustrations. The thickness of the flange is 2-in., and holes are spaced at 6-in. intervals through the flange for bolting units together in erecting a wall or to a steel joist in setting floors or roofs.

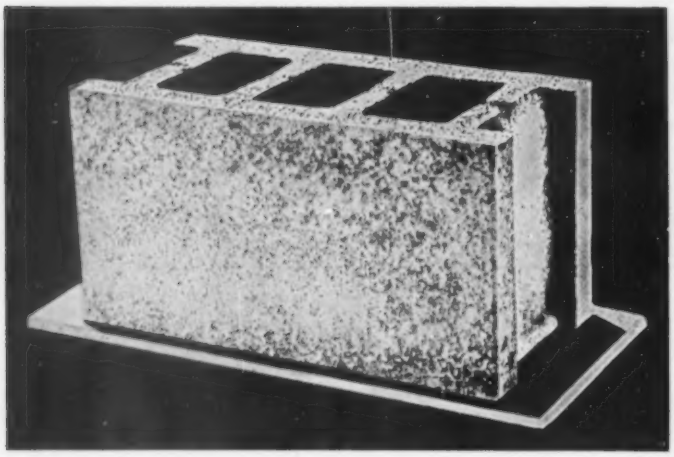
Fred W. Pfeifer, inventor of the new building unit, operating pneumatic machine, with the surplus box resting on the mold

How Units are Used In Construction

In setting up walls, the units are placed so that the flanges are vertical to give stiffness, and each wall unit has 20-gauge steel binders cast on the outside of each flange to give added strength. In the side of the wall exposed to the elements, the joints are caulked with asbestos caulking, and a $\frac{7}{32}$-in. diameter mastic cord is placed $1\frac{1}{2}$-in. back from the face in a circular opening formed by two adjoining semi-circular grooves cast in each flange. The erection procedure is entirely mechanical and each unit is bolted to the next with $\frac{1}{2}$- x 5-in. bolts.

In laying floors or roofs, the channel flanges are on the down side, and are bolted to the top of the steel joist, which is of 14-gauge steel and 8-in. in depth. For placing the ceiling below, square wood nailing strips are nailed to the bottom of the joist and serve as a fastening base. When the ceiling base is applied, a dead air space is left between floors, and, similarly, a dead air space is provided in the walls when metal lath is nailed across the channel flanges. As the units are all made with Waylite aggregate, they are readily nailable.

BETTER BLOCKS *for* BETTER HOMES



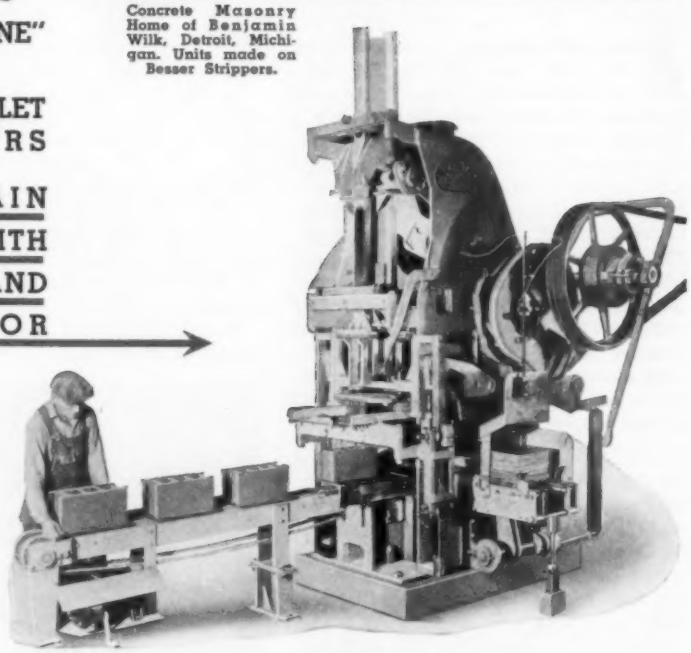
Concrete Masonry Home of Benjamin Wilk, Detroit, Michigan. Units made on Besser Strippers.

FULLY PRESSED TOP Concrete Masonry Units

"TRUE AND PERFECT AS CUT STONE"
Made Only On—

BESSER PLAIN PALLET STRIPPERS

100% AUTOMATIC BESSER PLAIN PALLET STRIPPER EQUIPPED WITH AUTOMATIC PALLET FEEDER AND AUTOMATIC FRONT CONVEYOR



BESSER BATCH MIXERS

5, 12, 18, 25, 30, 40, 50 cu. ft. capacities

Besser Batch Mixer with Skip Loader as mounted over Besser Plain Pallet Stripper.

Blades and Sectional Liners made of Wear-Long Metal.

BESSER PLAIN PALLET STRIPPERS

FULLY AUTOMATIC—3 Models—Capacities: 2000 to 4000 units per day.
SEMI-AUTOMATIC—4 Models—Capacities: 1000 to 2000 units per day.
POWER OPERATED with Hand Controls—2 Models—Capacities: 500 to 1000 units per day.
MULTI-MOLD—Hand Operated—Capacities: up to 300 units per day. For manhole blocks, brick, slabs and small cored units.
AUTOMATIC BRICK MACHINES—Capacities from 10,000 to 50,000 units per day. For brick, slabs, coal cubes and other small units.

Ask for Besser Plain Pallet Stripper Catalog. State Production Capacity wanted.

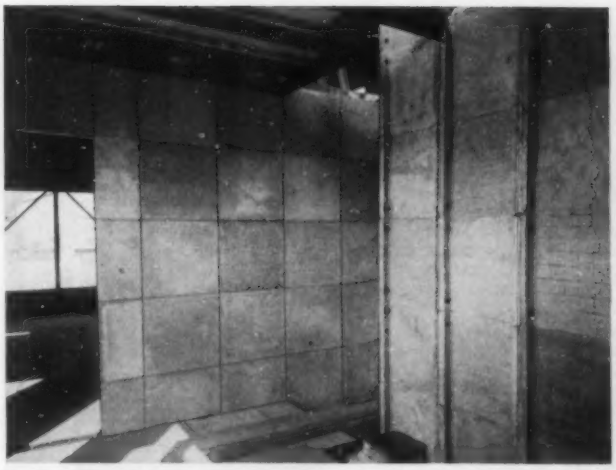
BESSER MANUFACTURING COMPANY

COMPLETE EQUIPMENT FOR CONCRETE PRODUCTS PLANTS

Complete Sales and Service on BESSER, ANCHOR, CONSOLIDATED, IDEAL HOBBS, UNIVERSAL, PORTLAND

209 37TH STREET ALPENA, MICHIGAN

EVERY CONCRETE PRODUCTS PLANT NEEDS A BESSER PLAIN PALLET STRIPPER



Left: Interior view of a house under construction, showing how the channel-shaped concrete units are laid up in the walls and in the floor. Note how they are tied in with the steel joists. Right: Part of storage yard with units ready to be shipped. In the foreground is a carborundum saw for cutting fractional pieces

Exterior walls may be painted or stuccoed and concrete or composition floors can be superimposed on the floor slabs, if desired.

The plant is located on property leased from the Cities Fuel and Supply Co. It in turn handles the sales in Milwaukee and adjoining counties.

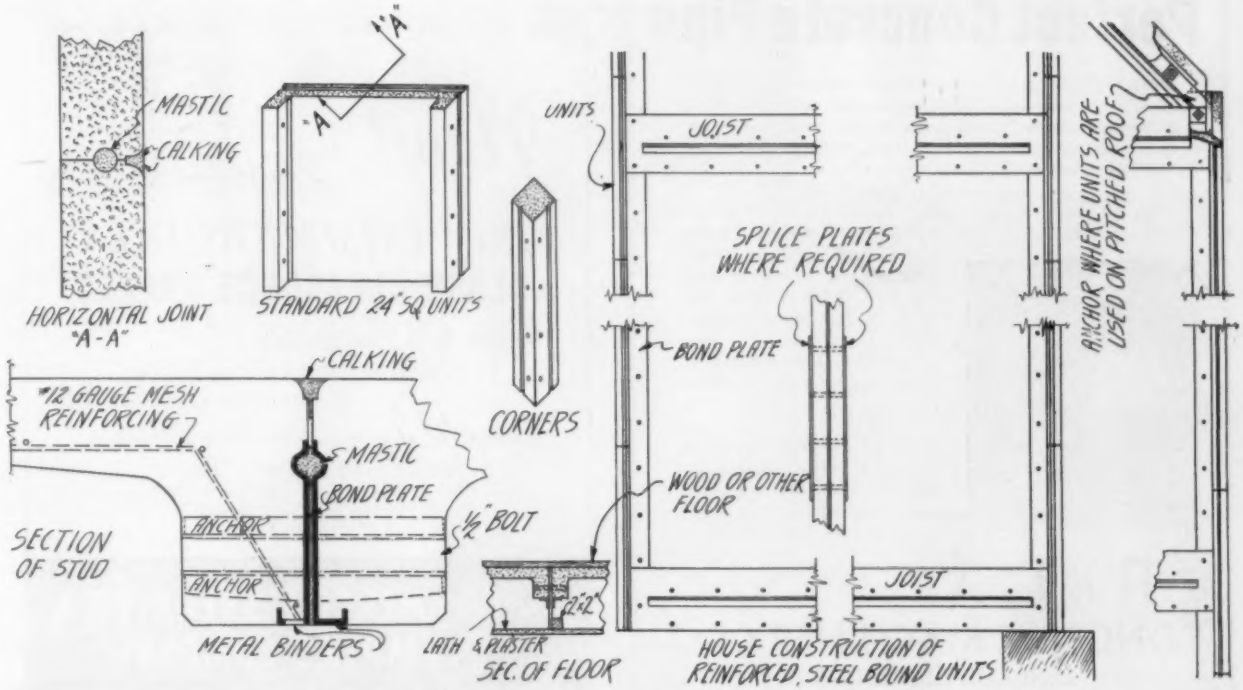
Special Machine to Make Units

A specially built jolt vibrator machine, operated pneumatically, is used to make these new concrete building units. Waylite aggregate (graded from 3/16-in. down) is shipped in by rail and placed in overhead bins serving the new plant. Mixing is done in a 9-cu. ft. mixer located on the overhead floor, and the semi-wet mix runs by gravity through a chute to the machine. The overhead mixer is not directly over the machine so a short screw conveyor is used to place the concrete in the mold.

As shown in the illustrations of the machine, the mold box is set over an air-actuated piston, with the flanges pointing downward. Each unit is reinforced with 12-gauge, semi-hard galvanized steel wire with 3-in. square mesh, and the reinforcing is shaped in the machine itself to fit the unit.

Air is delivered into the cylinders of the machine at 85 p.s.i. by an Ingersoll-Rand air compressor. The operation is as follows:

With the reinforcing mesh in place, a surplus box is let down to rest on top of the mold box. Concrete is released into the mold box, a valve is turned, and a 2-in. reciprocating lift is applied at the rate of 85 strokes per minute. After the concrete is jolted into place, another valve is turned and a sliding steel plate strikes off the excess concrete from the top of the mold box and also serves as a bottom for the surplus box. The next step in operation is to raise



Details of new concrete wall, floor, and roof units, showing how they are used in typical house construction

You can make more money with

MULTIPLEX

equipment . . . .

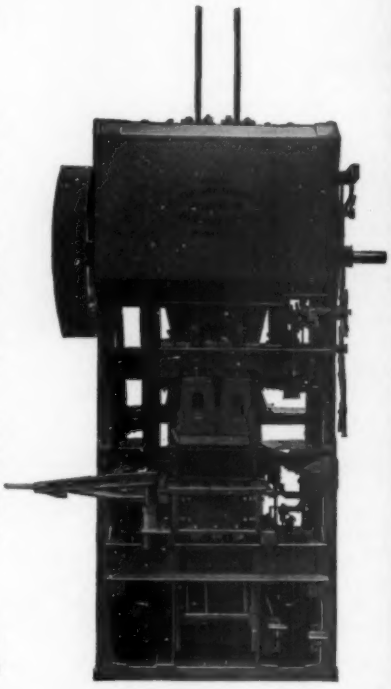
Every MULTIPLEX machine is simple in design, strong in construction, properly balanced, free from vibration, noiseless in operation and made of finest material. No sprockets, chains, gears or clutches.

Tampers operate independently of each other to insure uniform density of blocks. Will handle concrete, cinders or any light weight aggregate with perfect satisfaction. Can be used for stripper or face-down blocks.

Capacities range from 1000 to 3000 units per day of regular 8"x8"x16" or other size. Twenty different models to fit your demands.

Write today for complete details about MULTIPLEX Hand Machines, Double Strippers, Single Strippers, Tile Machines, Flue Block Machines, Random-Ashlar Machines, Brick Machines, Moulds, Forms, Power Machines, Power Presses, Power Tampers, Power Strippers, Super-Tampers, Mixers, Cars, Racks.

Complete plants designed and installed.



THE MULTIPLEX CONCRETE MACHINERY CO.

ELMORE, OHIO

R&L Forms Make Perfect Concrete Pipe

Nearly thirty years' experience in building concrete pipe machinery have resulted in the development of "Crescent" forms which make perfect reinforced pipe. Every detail exactly worked out, whether for 8" or 108" in diameter.

This all-steel bell-end form is constructed of prime blue-annealed steel, substantially reinforced with angle and bar steel, electric welded and riveted to assure long life and uniform pipe. The R & L line also includes forms for making all sizes of Bell-end and Reinforced Tongue-and-Groove Concrete Pipe.

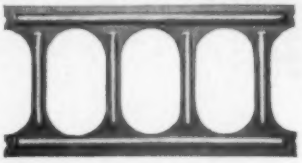
Every part is precision made and the entire unit is so easily operated that any common laborer can run it with a few simple instructions.

Write today.

R & L
CONCRETE MACHINERY CO.
KENDALLVILLE, INDIANA

COMMERCIAL PRESSED STEEL *"Close Clearance"* PALLETS

New!



the "COMMERCIAL"
CLOSE CLEARANCE PALLET

Deeper Rib Embossing
Greater Bend Resistance
Accurate Core Box Fit

Ideal for the New Vibrating Machines
MAKES PERFECT EDGES

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WRITE US

The COMMERCIAL SHEARING & STAMPING COMPANY
YOUNGSTOWN, OHIO.

the surplus box, remove the mold to an industrial car, lower the surplus box over a fresh mold, release the concrete from the surplus box with the addition of new feed, and the process is then repeated.

Capacity of the machine is two 24-in. square units per minute, weighing 38 lb. each. The principle of jolting with a semi-dry mix was adopted for a definite purpose. Too wet a mix would have the tendency to more than coat each particle of aggregate and would thereby lessen the insulating value desired in these units. According to Mr. Pfeifer, proper handling by jolting the concrete mass will adequately coat the aggregate particles without filling the cells of the aggregate and yet give sufficient cement paste to coat the reinforcing steel and insure proper bond.

Straight line production methods are used in the plant, the industrial cars being brought to the machine on 24-in. gauge track and complete a circuit to the curing kiln. The units are high-pressure, steam-cured in a 6- x 37-ft. cylindrical steel kiln which has a 3/16-in. shell thickness and withstands a maximum pressure of 50 p.s.i. The procedure is to fill the kiln and seal it during the day. Steam at 5 p.s.i. is applied from 3 p. m. to 6 p. m. After this period the steam pressure is raised to 50 p.s.i. and maintained for six hours. It is then shut off and the steam pressure allowed to taper off slowly.

In the morning the units are ready for delivery, or are placed in storage, a turntable being provided in front of the kiln for switching cars. High early strength cement is used to take advantage of an early initial set before handling into the kiln to start the curing cycle.

Test Data

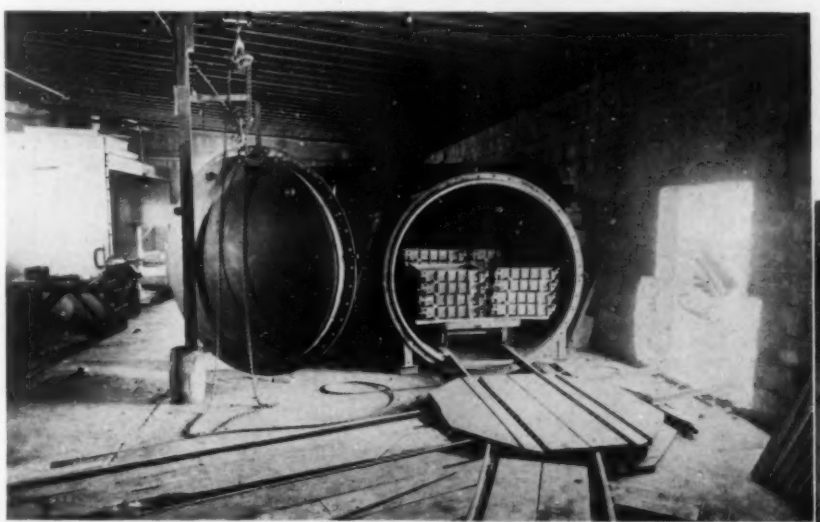
A series of tests were conducted recently at the University of Wisconsin, under the direction of Professor Kurt F. Wendt, to demonstrate the behavior of floor panels of "Pfeifer unit" construction under load and to determine the ultimate strength of such construction. In the laboratory two identical floor panels were assembled, each 4- x 12-ft., using 12 standard 2- x 2-ft. floor units and three No. 14 gauge steel joists, 8-in. in depth. The panels were supported on regular wall sections, and the joists were bolted to the wall sections with two ½-in. bolts at each end. The arrangement was such as to give a measure of the deflection of the panel and the vertical displacement of the panel with respect to the wall supports due to end shear and bearing effects.

Two additional panels, 2- x 2-ft., were also assembled to determine the vertical displacement of the ends of the joists due to shear and bearing loads. The units tested were manufactured in the conventional method in the jolt vibrating machine with the galvanized iron wire mesh placed 1⅛ in. below the face of the unit.

Tests were conducted without a floor slab covering of any kind other than that furnished by the units themselves. The results of the tests would show greater strengths if any regular flooring material were added, because of added stiffness. The maximum concentrated center loads on the floor panels were 7435 and 8555 lb. respectively, or the equivalent of 309 and 358 lb. per sq. ft. distributed uniformly over the panel. Measured deflection with a panel load of 40 lb. per sq. ft. averaged 0.131 in. with an average set of 0.013 in. after removal of the load. The measured deflections with a load equivalent of 100 lb. per sq. ft. averaged 0.348 in. with a set of 0.056 in. after removal of the load. Shear displacements at load equivalents of 40 and 100 lb. per sq. ft. were 0.002 and 0.017 in. respectively. When excessive loads were imposed to the extent of 309 and 358 lb. per sq. ft., respectively, both panels ruptured in compression at the center. The end bolts showed no signs of shear failure and the end holes in the joists exhibited no signs of bearing failure.

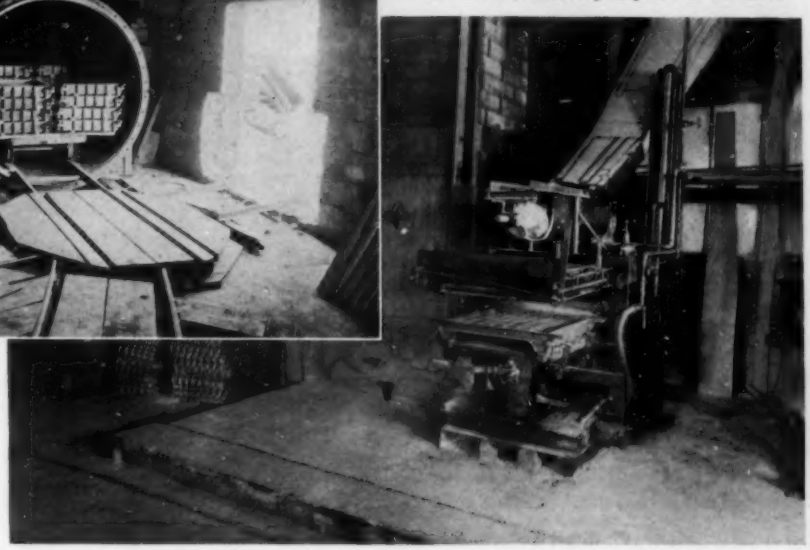
On the shear panel tests, designed to check the strength of the end connection, the joists finally failed by buckling laterally and the ultimate values are not positive since no lateral support was provided. Pronounced displacement under loads, held constant for periods in excess of 15 minutes, began at about 7400 lb. or the equivalent of a uniformly distributed floor load of 310 lb. per sq. ft. on a 12-ft. span. Lateral buckling of the joists occurred at an average equivalent load of 600 lb. per sq. ft. based on a 12-ft. span.

Officers of the Wisconsin Units Co. are Fred W. Pfeifer, president; Art P. Vander Heyden, vice-president; James E. Booth, secretary-treasurer.



Above: Curing kiln. Transfer table in the foreground is used to place in kiln the small cars loaded with units and to take them out to storage

Below: Pneumatically operated machine developed by Fred W. Pfeifer, showing the surplus concrete box in raised position with the mesh reinforcing in place in the mold



Future Prospects for Housing Encourage Products Men

Cinder Concrete Products Convention

ATLANTIC CITY, N. J., was a congenial host city to the fifteenth annual convention of the National Cinder Concrete Products Association, on August 1, 2 and 3. It was considered the most successful convention yet held by the group. Attendance included over 100 members and guests, who were treated to a highly diversified and instructive program.

Roy N. McCandless, Cinder Block, Inc., Detroit, Mich., was again chosen to head the association as president for the coming year. Vice-presidents elected were M. W. Ferguson, Cinder Block, Inc., Roanoke, Va., and John C. Chenery, Mahlstedt Materials, Inc., New Rochelle, N. Y. H. H. Longenecker, Philadelphia, Penn., was reëlected secretary and treasurer and Miss Katherine M. Bader was elected assistant secretary.

Fitting Products to Housing Market

After the president's address of welcome, E. W. Dienhart, assistant manager, Cement Products Bureau, Portland Cement Association, Chicago, discussed informally "The Housing Market—Fitting Our Products to that Market." Mr. Dienhart told of the uses and applications to which units of cinder concrete could be put in the construction of homes and pointed out the profit opportunities for manufacturers of cinder concrete masonry in developing this large market for products.

This discussion was followed by a paper, "A Home for $3490," by Charles P. Lowes, Jr., Bethayres Concrete Products Co., Philadelphia, Penn., in which were described the sales policies used

Roy McCandless, re-elected president

to promote low cost housing of the one family dwelling in Philadelphia. Mr. Lowes has been a leader in the promotion of the concrete masonry dwelling in his territory.

Effective Selling Policies

The remainder of the first convention session was taken up with a discussion of selling policies that are proven and have been getting the business. One of these papers, "Coöperative Program of Eastern Concrete Products Association," was prepared by S. W. Williamson, Media Concrete Products Co., Media, Penn., who described his methods.

Some of the "gang" on parade in front of convention headquarters in Atlantic City

Edmund H. Brooke, New York, read a paper on "Coöperative Selling in Greater New York City" and J. Bryant Heard, architect, of Danville, Va., reviewed "Architectural Requirements for Cinder Masonry Units." The first meeting concluded with an excellent paper on the value of painted surfaces for cinder concrete houses by Dudley D. Sherman of the National Chemical and Manufacturing Co., Chicago.

Fundamentals of Curing

An entire morning session was devoted to papers dealing with raw materials, manufacturing methods, and to discussions of product quality and standards. Paul M. Woodworth, engineer and housing consultant, Chicago, Ill., had a paper, "Fundamentals of Curing—Relation Between Various Curing Methods—Air, Low Pressure Steam, High Pressure Steam, Covered Storage," in which the subject of curing was treated from the standpoint of manufacturing and quality considerations. Lloyd W. Weed, district engineer, Portland Cement Association, New York, read the paper in the absence of Mr. Woodworth.

In this paper, Mr. Woodworth pointed out improper practices and how they often increase the final manufacturing unit costs. Referring to economies in operating practices, he said that any method of curing that will shorten the period whereby the pallet may be reused is desirable, since the investment in pallets in block plants is fairly large. Also, early yardability was mentioned as an important factor in cutting the investment needed for curing facilities.

In discussing the tendency toward increasing the yield in units per sack of cement, he cautioned against reducing the cement content to the point where web cracking will occur during the curing cycle and subsequent handling costs the products manufacturer more than the savings in material costs.

From the standpoint of quality, moisture content in the unit at the time of delivery is an important factor having to do with the satisfactory use of the units, according to Mr. Woodworth, and methods of curing should be selected to reduce the moisture content below specified limits within a reasonable length

(Continued on page 74)

Trucking Batched Aggregates, Transfer Plant, and Truck Mixers

Cut Ready-Mixed Concrete Costs

By BROR NORDBERG

BY TRUCKING BATCHED AGGREGATES from its Mound St. gravel plant to the construction site of a large federal housing project and by building a temporary transfer plant, the Arrow Sand and Gravel Co., Columbus, Ohio, is furnishing 14,000 cu. yd. of ready-mixed concrete to the contractor and at the same time is serving its regular customers without additional delivery equipment.

The Olentangy project, as it is called, is now under construction by L. L. LeVeque Co., Columbus contractor, who recently completed the widely publicized Laurel Homes, a $6,000,000 project in Cincinnati. Ready-mixed concrete has been specified for the pouring of foundations, floors and columns in the Columbus project, which will embrace 1200 individual apartments. Work is financed by the contractor, guaranteed by the federal government, and is to be completed in three units of 400 apartments each.

Construction is under way now in the former Olentangy amusement park on High St. five miles north of downtown Columbus, or a distance of 6½ miles from the aggregate plant. The contract called for a maximum of 250 cu. yd. of concrete per day.

At the building project, the mixer trucks are backed up on skids to discharge into cement buckets. Buckets are moved by crane to the forms

Ten Jaeger transit mixers of 2½-cu. yd. capacity on White trucks are operated by the Arrow Sand and Gravel Co. to fill local orders. On a direct haul of 6½ miles from the batching equipment at the aggregates plant, it is doubtful that the entire fleet of ready-mixed concrete trucks would have been sufficient to meet peak demands for the project even at the sacrifice of all local business.

Stephen Stepanian, vice-president and general manager of the Arrow Sand and Gravel Co., who is known throughout the aggregates industries as an outstanding operating man, took the contract and apparently he is satisfying the contractor as well as his other customers. Deliveries began late in June and, so far, the maximum requirement has been 56 cu. yd. of concrete in a single hour and 380 cu. yd. for the peak day.

Stephen Stepanian, vice-president and general manager, demonstrates the operation of temporary batching plant. To the right is the water-measuring tank; to the left the 15-bag capacity cement boxes. Sacks of cement are placed on skids with tied ends faced so workmen do not have unnecessary handling

Operate Trucks to Maximum Capacity

Absorbing the long haul to the amusement park in trucking the batched aggregates, and handling the concrete over a short haul from the transfer or batching plant especially built for that purpose in the park, has resulted in substantial economies. All activities are so synchronized that there is little wasted effort and idle time of truck mixers; yet the contractor has concrete available wherever and whenever he wants it.

By operating the truck mixers within the amusement park and not on city streets, they are not subject to city weight regulations and are operated to their full capacity of 3 cu. yd. instead of 2½ cu. yd., which is the maximum permitted on city streets. To take advantage of this 20 percent increase in

capacity, the transfer plant has been designed accordingly for 3-cu. yd. batches, and the aggregate hauling trucks handle the exact proportions of sand and gravel by weight for a 3-cu. yd. batch. These trucks are hired and haul 5.1 tons of aggregate to the load.

For a normal pouring schedule, 11 of these trucks are in service and four transit mixers are required to keep pace with the contractor. The length of haul for the mixer trucks is ¼ mile, which is ideal for proper mixing in transit at the normal drum revolving speed. In order to expedite the delivery of aggregates, a route has been laid out in the city whereby the truck drivers avoid main traffic arteries and congested areas. The entrance to the park is off of High St., one of the heavily traveled streets in Columbus, so a new entrance was made on a side street and a two-lane gravel road was constructed to the transfer plant.

Transporting sacks of cement from storage to the measuring hopper by means of lift trucks and special skids designed to hold 15 sacks per load

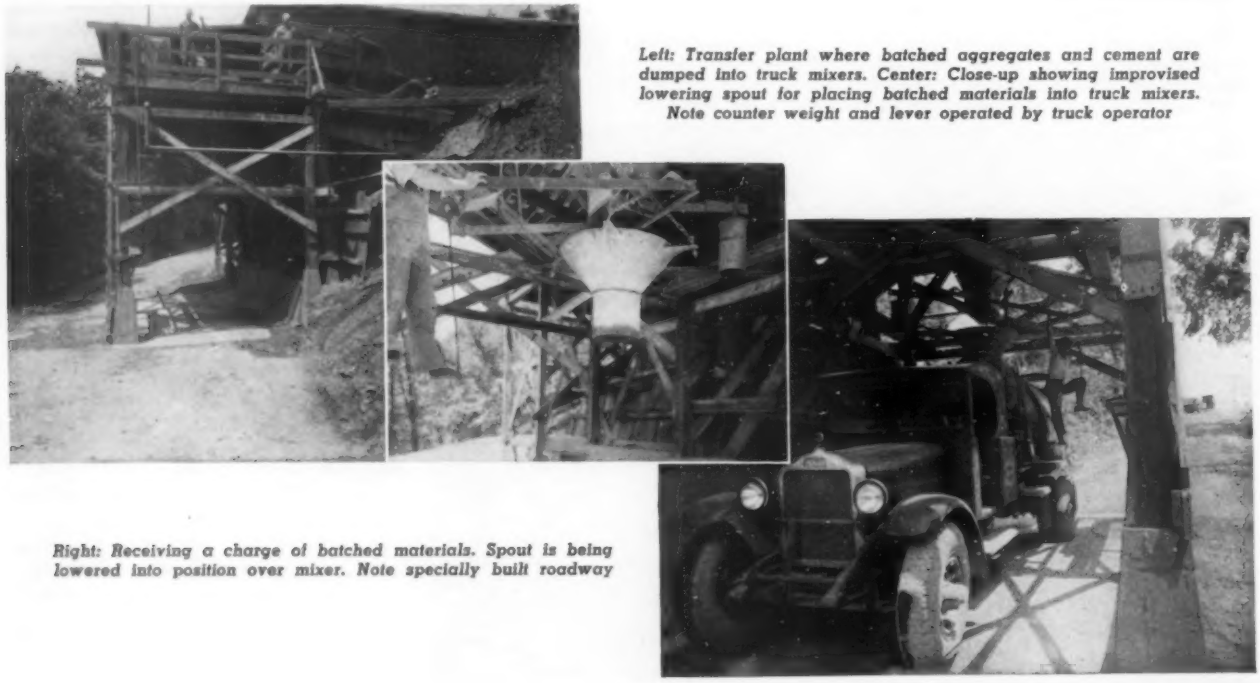
Batching Plant Fits Into Topography

In designing the transfer plant, Mr. Stepanian took advantage of a 20-ft. differential in elevation in the topography of the land. The cement warehouse and the hopper into which the end-dump trucks discharge aggregates are on the higher level and a timber structure was erected from the lower level to support the batching and material-handling equipment. Here, too, a gravel roadway was built on the lower level for the ready-mixed concrete trucks, to permit them to come in on one side of the plant, receive their charge of materials and drive out the other to the construction site.

Arranged to make the handling of cement as easy as possible, the cement warehouse is 30 ft. wide and 50 ft. in length, with a capacity of 800 bbl. A plan has been worked out with a hauling concern to deliver sacked cement into the warehouse from a railroad siding 1½ miles away. The floor of the warehouse is on the level of the truck tailboards so that the cement can be conveniently handled and placed in the structure.

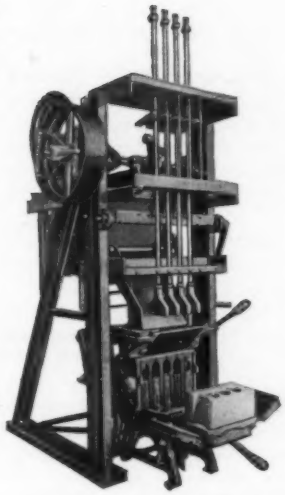
A number of special wood skids were made upon which 15 sacks of cement (for a 3-cu. yd. batch) are placed. These are handled into the plant from the truck by a 3500-lb. Barrett lift truck, and are placed at the far end of the warehouse next to the cement boxes. The cement sacks are piled on the skids with the tied ends all facing one side to reduce handling, and the warehouse floor has a downgrade slope of 6 in. to facilitate the movement of the lift trucks. A number of 15-sack batches of cement are stored in the warehouse on skids and these are handled to the batching plant when needed by another similar lift truck operated by an employe of the Arrow Sand and Gravel Co.

Extending out over the embankment is a 3-cu. yd. steel hopper. Trucks coming from the aggregate producing plant



Left: Transfer plant where batched aggregates and cement are dumped into truck mixers. Center: Close-up showing improvised lowering spout for placing batched materials into truck mixers. Note counter weight and lever operated by truck operator

Right: Receiving a charge of batched materials. Spout is being lowered into position over mixer. Note specially built roadway



"ANCHOR"

Complete equipment for making concrete, cinder and other light weight aggregate units, including engineering service for plants and revamping of old ones for more economical service.

Hobbs block machines, Anchor tampers, Anchor Jr. strippers, Stearns power strippers, Stearns mixers, pallets, Straublox Oscillating attachments, etc.

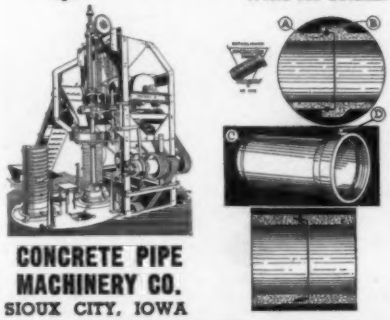
Repair parts for Anchor, Ideal, Universal, Stearns, Blystone mixers and others.

Anchor Concrete Mchy. Co.

G. M. Friel, Mgr. Columbus, O.

5 Reasons Why You Should Choose The Dual Packer Head Machine for Better Concrete Pipe Production

1. The Dual Packer Head offers the greatest economy in producing 4 to 36 inch pipe.
2. It enables you to operate on either full or partial production basis with smaller crews.
3. It eliminates pallets, allowing immediate stripping of molds.
4. It permits you to lease a portable unit to take care of those distant jobs at a profit.
5. Finally, it produces a superior pipe, highly resistant to abrasion and corrosion, and provided with New Sealtite Joint preventing leaks and excessive infiltration—a pipe Guaranteed to stand up. *Write for details.*



CONCRETE PIPE MACHINERY CO.

SIOUX CITY, IOWA

back up a slight incline alongside the cement warehouse and discharge into the hopper direct. Cement is placed in either of two cement boxes over the hopper. Each has a capacity of 15 sacks for one c-cu. yd. batch, one box being a reserve. The cement is discharged into the hopper simultaneously with the dumping of aggregates and the admission of water from a 250 gal. Jaeger water tank, to take advantage of some mixing action within the hopper and in the chute through which the transit mixer receives its charge.

Continuous Pouring Schedule

Pouring of concrete on the job is done on a continuous schedule, the contractor keeping in touch with the aggregate plant by telephone as to his wants and controlling the exact number of batches which will be delivered to the transfer plant. He also notifies the aggregate plant as to when pouring will be finished on any particular day. When the day's run is completed, the driver of the ready-mixed concrete truck returns to the aggregate plant and his truck is put to work on other jobs.

Truck mixers are parked for the night at the aggregate plant and the next morning each one delivers on the job 2½-cu. yd. of concrete. The truck mixers do not leave the construction site until the day's pour is completed, and the gravel trucks go into service.

Drivers of gravel trucks carry with them order slips for concrete made out in triplicate. One ticket is taken up by the mixer man at the transfer plant, and the mixer truck driver gives a second slip to the contractor when he delivers the concrete, and keeps the third.

At the transfer plant the drivers of the mixer trucks, after being signalled by the mixer man on the floor above that the hopper is filled, operate the levers to discharge the materials into the truck mixers. One lever lowers a loading spout into the opening of the mixer drum, as shown in one of the illustrations.

The entire operation takes a minute or less and the truck is on its way to the construction site, where it is backed up an incline and discharged into concrete buckets. These in turn are handled by crane to the forms. The set-up is temporary, of course, but was instrumental in getting a fair order to supplement the regular run business.

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PRECAST CONCRETE SEPTIC TANKS

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Write for Details about Steel Forms

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Kingsville, Ohio

SPECIAL AGGREGATES

MICA CRYSTAL GRIT

A beautiful dark, sparkling granite material for cement facing, artificial stone and all cement articles.

MICA CRYSTAL CO., INC.
Dept. R Warren, N. H.

CEMENT COLOR

STAR and ANCHOR COLORS

Geo. S. Mepham Corp., East St. Louis, Ill.
C. K. Williams and Co., Easton, Penn.

Completes Large Order

SHELTON CONCRETE PRODUCTS, Shelton, Wash., has recently completed its largest single order in four years, in furnishing materials for a state highway improvement project on the Olympic Peninsula highway. Among the products hauled by truck on this job were 1000 ft. of 18-in. reinforced concrete pipe; 150 ft. of 12-in. reinforced concrete pipe; 200 ft. of 18-in. plain concrete pipe; 200 ft. of 24-in. reinforced concrete pipe; 600 No. 6 round concrete guard rail posts; 100 concrete highway markers.

Concrete Brick

GROVE STONE AND SAND CO., Swannanoa, N. C., is operating a new "Dunbrik" plant on the Black Mountain highway on the site of the old aggregate plant operated by the company. Sand is being taken from a large stockpile which had accumulated and is washed and screened for the manufacture of concrete brick. The new plant is equipped with a "Dunbrik" machine having a capacity of over 14,000 brick in nine hours and produces various textured and colored brick in addition to common brick. Horace Jones is in charge of the plant.

EASTWOOD SAND AND GRAVEL WORKS, R. H., Grayville, Ill., is now manufacturing "Dunbrik" as well as a line of other concrete products. Concrete brick are being made in a variety of tints and colors.

HOUSTON MARBLE WORKS has been awarded a year's contract to supply Houston County, Ala., with concrete pipe for road building purposes.

HOUSTON CONCRETE PIPE CO., Houston, Texas, has installed some new equipment for manufacturing double strength culvert and sewer pipe, according to an announcement by President W. B. Dixon.

News About People

Louisiana Makes Fischer A Colonel

WILLIAM W. FISCHER, president of the Fischer Lime and Cement Co., Memphis, Tenn., may startle you at the next convention by coming out in brass buttons and mufti of a colonel, but he will be entitled to wear the full regalia as he has been appointed a full-fledged colonel on the staff of Governor Richard Leche of Louisiana. The appointment is reported to have originated at a party which he attended on March 19 at Couchwood, Harvey Couch's famous Arkansas estate. However, let him tell the story.

•

E. A. BURR, secretary of the Cleveland Quarries Co., Cleveland, Ohio, has been appointed vice-president of the company.

•

D. WALLACE STEWART, formerly general sales manager of Canadian Refractories, Ltd., Montreal, Canada, is the new vice-president of Basic Dolomite, Inc., Cleveland, Ohio.

•

SAM R. RUSSELL, well known authority on explosives with E. I. duPont de Nemours & Co., Inc., Wilmington, Dela., and J. W. Koster, recently played an important part in a radio broadcast of a tunnel blast.

•

S. R. DOLASA, who will be remembered as a recent visitor from India, is now superintendent of works of the Associated Cement Co. of India, Ltd., Nagpur, India. An account of his visit in the April issue of ROCK PRODUCTS mentioned that he had graduated from an engineering school in England. He advises that this report is incorrect and that he graduated from a college in India.

•

GEORGE A. CAMPBELL, president of the Concrete State Bank, Concrete, Wash., resigned his office when the Superior Portland Cement Co. sold its interest in the bank to Walter Ross, cashier. Mr. Campbell will devote all his time to the cement company.

•

ANDREW LUNDTEIGEN, vice-president of the Ash Grove Lime and Portland Cement Co., Kansas City, Mo., was recently honored by the American Society for Testing Materials as a Forty-Year Member.

•

A. M. TURNER, formerly supervisor of plaster quality, Three Forks Portland Cement Co., Trident, Mont., has become associated in an official capacity with Schumacher Wallboard Corp., Los Angeles, Calif., handling control analysis and research work.

•

H. E. CARNEY, JR., has been elected president of The Carney Co., Mankato, Minn., succeeding his father, the late H. E. Carney. Other officers elected are W. B. Lee, former treasurer, as secretary, treasurer and general manager; C. J. Jacobson and W. R. Oglesby, chemist, vice-presidents. Mr. Lee has been associated with the company for the past 25 years, serving successively as driver and cement tester, bookkeeper, office manager and treasurer. Mr. Oglesby started with the company as chemist in 1929 and will continue in that office in addition to his duties as vice-president. He has had a long experience, having been associated with the Warner Co., Spackman Engineering Co., Wabash Portland Cement Co., Hidalgo Cement Co. of Mexico, and E. I. duPont de Nemours Co., Inc.

•

H. S. BRIGHTLY, for 18 years in charge of promotion and field service activities of the Indiana Limestone Institute and secretary-director of the Building Stone Association of Indiana, has become architectural engineer with the U. S. Army, quartermaster general's department, Washington, D. C.

•

E. J. KAUFMAN, general manager of the Marble Cliff Quarries Co., Columbus, Ohio, has been elected a director to serve on the Board of Directors of the National Association of Cost Accountants. Mr. Kaufman has been an active member of the accountants' association, and in 1936 and 1937, he was president of the organization.

•

HAL H. HALE, a T.V.A. projects planning engineer and formerly city engineer of Knoxville, Tenn., has resigned to become Southeastern office engineer of the Portland Cement Association, with headquarters in Atlanta, Ga.

•

HAROLD MYERS, who for the past three years has been in an official capacity with the Cooley Gravel Co., Chillicothe, Mo., has resigned to become superintendent of the power plant at Plattsburg, Mo.

•

ROBERT B. FROST, assistant superintendent of the Lone Star Cement Corp., Hudson, N. Y., has been transferred to take the same official position at the Greencastle, Ind., plant. Mr. Frost has been with Lone Star for the past 14 years, and his transfer is in the nature of a promotion. Mr. Frost was assistant superintendent of the Hudson plant for several years, and then resigned to become plant manager of the Washington Lime and Stone Co., Bakertown, W. Va. After a year, he returned to the Hudson plant and resumed his position as assistant superintendent.

•

C. E. KLAUS, superintendent of the Columbia Quarry Co. plant at Columbia, Ill., has resigned to take a position with the Charles Stone Co., Mt. Vernon, Ill.

•

E. A. HEISE, safety engineer of the Columbia Quarry Co., Columbia, Ill., has been made superintendent of the plant. He will continue his safety work in addition to his duties as superintendent. This promotion is in recognition of the excellent work he has done in making possible the winning of the National Crushed Stone Association Safety Trophy for the third year.

Employes of Wolf River Sand and Gravel plant at Memphis, Tenn., operated by Marquette Cement Manufacturing Co., winner of the 1937 Rock Products Safety Trophy conducted by the Bureau of Mines in coöperation with the National Sand and Gravel Association

Men Who Helped Win Safety Honors

WHILE SAFETY AWARDS are made to the companies, it is the personnel all the way along the line who are responsible for the records. Much of the credit, however, is due to the untiring efforts of those officers directly responsible for the safety program. In response to an invitation from the EDITOR, the following companies have sent in the names of officials whom they have credited with a large part of the responsibility for winning the safety contest conducted by the Bureau of Mines in coöperation with the National Sand and Gravel Association. The trophies awarded to the winners of the contest are provided by ROCK PRODUCTS.

•

THE WOLF RIVER PLANT, operated by the Marquette Cement Manufacturing Co., at Memphis, Tenn., was the winner of the trophy in the group of sand and gravel plants that worked 100,000 man hours or more during 1937.

R. I. GROGG, superintendent of the Wolf River plant, started in the sand and gravel business at his father's plant, known as the Auburn Novelty Works in Auburn, Ind., in 1912. In 1927, he enlisted in the U. S. Army, and during the war he became a lieutenant in the Air Corps. Following his discharge from the service in 1921, Mr. Grogg started to work for the old Wolf River Sand and Gravel Co. He worked in all departments of the plant and was made plant foreman in 1930, serving in this capacity until the Marquette Cement Manufacturing Co. took over the plant in 1936, when he was promoted to superintendent. There has not been a lost-time accident at the plant since July 13, 1936. Mr. Grogg has been very active in safety activities which were started at the plant on April 29, 1936. In celebration of the winning of the contest, the employes were given an old-fashioned southern barbecue picnic on July 30, at which safety talks were made by M. P. Greer, safety engineer, and Mr. Grogg.

•

AMERICAN AGGREGATES CORPORATION, Greenville, Ohio, had three plant winners receiving honorable mention for operation during 1937 without a lost-time accident. The managers of these plants are: E. E. Mills, Massillon, Ohio; A. B. Coppock, Logansport, Ind.; and Harley W. North, Kalamazoo, Mich.

•

STEWART SAND & MATERIAL CO., Kansas City, Mo., had three plants which won safety honors: two sand and gravel plants officially designated Kaw No. 2 plant, located on the Kaw River adjacent to Kansas City, Kansas, and the Missouri River plant with unloading facilities at the foot of Grand Avenue, Kansas City, Mo.; and the Pixley Crushed Stone plant.

WALT JUDEMAN has been in charge of Kaw River No. 2 plant since 1928. Prior to his connection with the plant in 1923, he was a machinist in the automobile industry in Los Angeles, Calif.

R. I. Grogg, superintendent of Wolf River plant

OWEN MCKAY, in charge of the Missouri River plant, came with the Stewart Sand and Material Co. in 1921, having previously been employed by the mechanical department of the Santa Fe railway. This plant includes a free dredge served by barges and a Diesel tow boat with an unloading plant at the foot of Grand Avenue, Kansas City, Kans.

H. T. JACKSON, manager in charge of the Pixley Crushed Stone plant, started operation of the stone plant connected with the predecessor of the company about 1926. When Stewart Sand and Material Co. took over the plant in 1930, Mr. Jackson was placed in charge of operation. During the War, Mr. Jackson served in the engineering corps of the army.

•

WYOMING SAND AND STONE CO., Scranton, Penn., another company receiving honorable mention, has had no lost-time accidents at the Wyoanna Sand and Gravel Plant since 1929. J. P. Eyre Price, vice-president, advises that Superintendent George E. Grindall should receive a large measure of credit for achieving this fine safety record. He has been careful to guard all machinery and to see that all steps and runways are in a safe condition.

•

BLUE RIVER SAND & GRAVEL CO., Blue Rapids, Kan., winner of a certificate of merit for 1937, reports through President F. E. Fitzgerald that A. B. Stryker and his co-workers were largely responsible for the excellent safety record at the Irving plant. It is a wet-pit operation with a daily capacity of from 20 to 30 cars.

•

THE CLEVELAND BUILDERS SUPPLY CO., Cleveland, Ohio, won a safety award for the excellent record of its Dock No. 10 plant. Unfortunately, the superintendent, Mr. Walter Feils, who was in charge of this plant, died early this year, and could not share in the honors. General supervision of this plant has been in charge of C. E. Ehle and his assistant, W. L. La Voo, who have worked very hard in the interest of safe operation.

Developing A New Industry

VAUGHAN MORRILL, general manager of the Long Valley Ore Co., Morristown, St. Lawrence County, N. Y., is an example of a man with vision, who came East instead of West to start a new industry in graphite, which had been under noses of natives for generations. He was founder and president of a large wood pipe manufacturing company in Tacoma, Wash. This company became one of the largest of its kind in the country and manufactured wood pipe that went to all parts of the United States as well as to Mexico, Central and South America, Sweden, the Philippines, the Far East. The development of arc welded steel pipe resulted in displacing wood pipe and Mr. Morrill sold his company. For the past several years he has used his knowledge of metallurgy, engineering and geology to study the great undeveloped mineral resources of St. Lawrence county. He studied and analyzed the Pope Mills graphite deposits and found them the richest in the country. He saw the great possibilities of developing a graphite industry in this county which could compete advantageously against the foreign graphite industry. He interested Lawrence F. Cuthbert, prominent St. Lawrence county capitalist and industrialist, in his plan. Mr. Cuthbert interested several of his associates and the Long Valley Ore Co. was formed.

· NEWS · OF · THE · MONTH ·

Big Merger of California Rock and Gravel Companies

GRANT-SERVICE ROCK AND GRAVEL CO., Fresno, Calif., will be merged with the San Joaquin Valley properties of the Pacific Aggregates, Inc., San Francisco, Calif., large northern California rock, gravel, and construction concern, in a $500,000 deal, according to an announcement from A. R. McMillan, manager of the Grant-Service company. The new firm will be known as the Grant Pacific Rock Co., and the headquarters will be maintained in Fresno. Pacific Aggregates, Inc., will continue to operate its properties north of the San Joaquin Valley separate from the new corporation. R. L. Felchlin, president of the Grant Service Rock and Gravel Co., is the president of the merged concern.

The properties which will be operated by the Grant Pacific Co. include rock and gravel plants at Rockfield, near Friant; Piedra, Lemon Cove and Lindsay. In addition retail yards are maintained in Selma and Fresno. A new plant capable of handling 2500 tons of rock and gravel daily is to be installed at Lindsay. The Grant Pacific Co. will handle rock and gravel, cement, building mortar, transit mixed concrete, road asphalt, road equipment, and will engage in a general contracting business.

Government Figures On Sand and Gravel Industry

TOTAL OUTPUT OF SAND AND GRAVEL in the United States in 1937, according to U. S. Bureau of Mines figures, amounted to 189,660,423 tons valued at $97,472,997, an increase of six percent in tonnage and eight percent in value compared with the 1936 production of 178,329,814 tons valued at $90,307,752.

Commercial operators reported sales of 125,342,478 tons valued at $79,114,318 in 1937, an increase of five percent in both tonnage and value over the 1936 production, and a rise in average value of 63 cents a ton, compared with 60 cents in 1936. Building sand production amounted to 26,050,459 tons, a decrease of six per cent from the 1936 figure. A decrease of four percent was shown in the 1937 production of building gravel, which amounted to 24,876,957 tons, compared with 25,850,985 tons produced in 1936. Washed or screened material amounted to 108,469,032 tons with an average value of 68 cents a ton, and accounted for 87 percent of the total commercial production. Methods of transportation were reported by companies accounting for approximately 87 percent of the commercial output. Of the 108,976,680 tons thus reported, 48 percent was shipped by rail, 39 percent by truck, and 13 percent by water.

Noncommercial production of sand and gravel accounted for a total output of 64,317,945 tons, valued at 29 cents a ton. Operations of this classification increased 10 percent in tonnage over the 1936 figure, due partly to the decided upward trend in production of structural sand and gravel, and a decrease of six percent in average value.

Resume Production

WASHINGTON - IDAHO LIME PRODUCTS CO., Orofiino, Idaho, cement plant has gone back into full production following a month's shutdown of the quarry and raw mills. The finish mills and shipping department continued operations during the month, but virtually a full crew of men was kept at work making needed repairs.

DEWEY PORTLAND CEMENT CO., Dewey, Okla., plant has resumed full operation after a shutdown since June 15. Officials of the company ordered the resumption of operations since stock was low and there is an improved demand for cement.

LONE STAR CEMENT CORP., Bonner Springs, Kan., plant is in operation again after a two-months' shutdown. Two kilns were started up. First shipments of cement were made from the recently re-opened and remodeled Spocari, Ala., plant early in July.

UNIVERSAL ATLAS CEMENT CO., Leeds, Ala., plant is reported to be in full production, after being entirely rebuilt at a cost of about $4,500,000.

Cement Publication

AMERICAN SOCIETY FOR TESTING MATERIALS has compiled and published in one volume all the standard specifications and test methods on cement issued by the Society. The specifications include those for standard portland cement, high early strength portland cement, natural cement and masonry cement. The Manual of Cement Testing is included in the compilation as well as a selected biography of literature on portland cement. Copies of the 96-page publication are available from the American Society for Testing Materials, 260 S. Broad St., Philadelphia, Penn., at $1.00 each.

Marquette Inaugurates Pension Plan

MARQUETTE CEMENT MANUFACTURING CO., Chicago, Ill., has announced a supplemental private pension plan for its employes effective September 1, 1938. The purpose of the plan, according to W. A. Wecker, president of the company, is to provide rates of pensions for employes earning $3000 per year and over, somewhat in line with rates provided under the Federal Social Security Act for employes earning less than that figure.

The federal plan provides at present for pensions to all employes based on earnings up to $3000 per year, with the effect of keeping an employe's pension stationary at $3000 regardless of his earning rate and creating a difference between the high and low classifications which is less favorable to the higher income group.

The purpose of the cement concern's plan is to overcome this disparity by providing supplemental pensions which, with the federal benefits, will provide pension rates more nearly approaching those in the lower income group. The plan provides for retirement annuity based on future service. The actual amount of the monthly pension payable from the normal retirement date arising from future service is the total of the separate monthly units of retirement annuity accumulated for each year the employe contributes to the plan, in accordance with a standardized rate table based on annual incomes. The Marquette Cement Manufacturing Co. is to pay the balance of the net cost for the benefits over and above employe's contributions.

In addition to this plan, to provide better pension rates for some of the older men, the company is purchasing additional retirement annuities for present eligible employes who have attained an age of 46 years and who subscribed to the plan on September 1, 1938. Annual rate of this additional annuity payable from the retirement date will be one percent of the employe's annual salary rate on September 1, 1938, multiplied by the number of full years of continuous service finished subsequent to his 45th birthday. The Metropolitan Life Insurance Co. will administer the plan.

Gravel Pit Changes Hands

BROCKMAN SAND AND GRAVEL CO., Coleridge, Nebr., is the name of a new firm which has taken over the Brockman gravel pit. Raymond Brockman is president; Lawrence Brockman is secretary-treasurer. It had been purchased by Foley Bros., Inc., Minneapolis, Minn., at a sheriff's sale.

Plant Improvement

THE MORROW COUNTY SAND AND GRAVEL CO., Mt. Gilead, Ohio, managed by Henry Irey of Marion, Ohio, has just installed new equipment for washing stone and sand. The new equipment includes an apron feeder, feed conveyor, scalping screen, inclined delivery conveyor, a 15,000-lb. jaw crusher, return elevator, scrubber, three-deck vibrating screen, concrete sand paddle tank, mason sand paddle tank, a 1-cu. yd. dragline, and four gasoline engines.

Triples Plant Capacity

SUGAR CREEK STONE QUARRY, Washington C. H., Ohio, operating a crushed stone plant on route 70 south of the city, is rebuilding the plant to triple its capacity. The new machinery includes an 18- x 36-in. Cedar Rapids jaw crusher and a Cedar Rapids belt bucket elevator, 55-ft. centers, with 24-in. buckets. The screening plant had an over capacity which will enable sizing of 100 tons of crushed stone per hour. Bin storage is to be considerably increased. Stone is to be delivered to the crusher in Chevrolet trucks. Two new trucks were added in January, 1938. The average truck load will be three tons. The illustration shows the new crusher upon delivery to the plant. On the extreme right is E. F. Armbrust, owner of the plant, and to his right is Alvin Armbrust, plant manager. The crusher, weighing 20,390 lb., was hauled five miles to the plant in a standard 1½-ton Ford truck equipped with a heavy flat bed.

Concrete Manual

BUREAU OF RECLAMATION, U. S. Department of the Interior, Washington, D. C., has published the first edition of a manual for the control of concrete construction.

Although the manual is intended primarily for the guidance of Bureau field organizations, it is applicable to the control of concrete construction in general, and is available for sale to the public at $1.00 per copy.

The book has been divided into four general divisions: Part One, chapters I and II, is devoted to information and discussion of the properties of and requirements for concrete and its ingredients; Part Two, chapters III and IV, deals with investigations, in the field and Denver laboratories, of the materials available for use in projected construction; Part Three, chapters V, VI, VII, and VIII, relates to concrete construction and its control; Part Four comprises a group of appendices which include test procedure, mix design and computation data, and other information for reference use.

Removing Plant

CAMP CONCRETE ROCK CO., Ocala, Fla., is preparing to open a new deposit four miles north of Brooksville, Fla., having exhausted its source of supply at Camp. The plant closed down at the abandoned site about three months ago after being in operation since 1925. The new workings are to be in operation about the first of the year.

CONSUMERS CO., Racine, Wis., plant had a foreman electrocuted in the quarry recently as he was operating electrical equipment controlling cars hauling stone.

Delivering 20,390-lb. jaw crusher in a light weight truck. E. F. Armbrust, owner of the Sugar Creek Stone Quarry, to the right, and Alvin Armbrust, plant manager

Cement Imports and Exports

METALS AND MINERALS DIVISION, Bureau of Foreign and Domestic Commerce, revealed, according to preliminary statistics, that 37,078 bbl. of cement valued at $83,999 were exported from the United States in June. The cement trade in May totaled 47,187 bbl., valued at $133,418, and in June, 1937, 40,061 bbl. valued at $111,785, according to the report. Imports of cement increased to 72,395,140 lb., valued at $155,239 in June, from the 51,092,770 lb. trade of May, valued at $108,394. Receipts in June, 1937, amounted to 54,575,456 lb., valued at $117,682.

Ohio Counties May Not Engage In Gravel Business

ACCORDING TO A REPORT by Ohio State Examiners filed recently with County Auditor Earl Sexton, county surveyors or county commissioners may not legally sell gravel from county pits to township trustees or contractors. Citing an opinion rendered by the attorney general in 1930, the examiners ordered the practice stopped. Champaign county owns and operates several gravel pits, and for years it has been the practice of county engineers to sell gravel from these pits to township trustees and contractors.

Extend Wet Pit Operation

SAXET SAND & GRAVEL CO., Corpus Christi, Texas, is extending its sand and gravel operation near Victoria, Texas, and is now excavating a new pit. A dredge barge is now being constructed, and water is being pumped into the pit from the adjacent lake.

Interrupted Production

UNIVERSAL ATLAS CEMENT CO., Independence, Kan., plant was shut down for the month of August, with bins full and shipments continuing from stock.

MONARCH CEMENT CO., Humboldt, Kan., stopped production late in July for an indefinite period, a number of men being retained for repair work and in the shipping department.

LEHIGH PORTLAND CEMENT CO., Metaline Falls, Wash., plant suspended production in July for an indefinite period, retaining a number of employes to do repair work. The plant at Iola, Kan., also was down in July and a crew of men was given employment in the construction of new bath houses, etc., during the temporary shut down.

ASH GROVE LIME AND PORTLAND CEMENT CO., Chanute, Kan., plant suspended operations indefinitely on July 29 due to inadequate demands for cement.

Financial Notes

RECENT DIVIDENDS ANNOUNCED

Asbestos Corp., Ltd., extra	$ .50	Sept. 30
Asbestos Corp., Ltd., quarterly	.50	Sept. 30
California Art Tile	.25	Sept. 1
Canada Cement Co., pfd.	1.00	Sept. 20
Canada Cement Co., pfd.	1.00	Oct. 1
Lone Star Cement	.75	Sept. 29
Monolith Cement Co., pfd.	.25	Aug. 15
Raymond Concrete Pipe Co.	.25	Aug. 1
Westvaco Chlorine Prod.	.25	Sept. 1
U. S. Gypsum Co.	.50	Oct. 1
U. S. Gypsum Co., pfd.	1.75	Oct. 1

UNITED STATES GYPSUM Co., Chicago, Ill., reported for the six months ended June 30 a consolidated net profit of $2,181,219. This compares with a net profit of $3,401,253 for the first half of 1937.

CONSOLIDATED SAND & GRAVEL, LTD., Toronto, Canada, has notified the Toronto Stock Exchange that the transfer agents have cancelled certificates covering 97 preferred shares which have been redeemed by the company. There is now a total of 7873 preferred shares outstanding.

FLORIDA PORTLAND CEMENT Co., with a plant at Hookers Point, Fla., reported for 12 months ended June 30, 1938, net income of $184,387, contrasting with $136,949 in the corresponding period of 1937.

NORTH AMERICAN CEMENT CORP., New York, N. Y., reported for the 12 months ended June 30, 1938, net loss of $792,996 after taxes, depreciation, depletion and interest, but before profit on bonds purchased, against net loss of $336,407 for the 12 months ended June 30, 1937.

AMERICAN AGGREGATES CORP., Greenville, Ohio, reported for the years ended December 31:

	1937	1936
Net sales	$1,513,750	$1,330,183
Cost of sales	1,115,004	990,378
Operating expenses	125,517	136,303
Depreciation and depletion	232,998	251,994
Operating profit	40,231	(d)48,492
Allied operating income	130,716	(dr)6,173
Net operating profit	170,947	(d)54,665
Other income	148,933	51,144
Total income	319,880	(d)3,521
Interest charges	87,296	67,915
*Other deductions	54,698	313,922
Federal income tax	20,000	.....
Net income	157,886	(d)385,358
Times charges earned	3.66	.....
Earned per share, pfd.	$8.84	.....

*1937, loss on sale and dismantling of plant and equipment; 1936, $263,452 loss in liquidation of mortgage notes receivable and $50,470 settlement of rental contracts.

Current assets as of December 31, 1937, were $622,668 and current liabilities $216,828.

NATIONAL GYPSUM Co., Buffalo, N. Y., reported for six months ended June 30, 1938, net profit of $395,503 after depreciation, depletion, interest, federal and Canadian income taxes, etc.

Consolidated balance sheet as of June 30, 1938, shows total assets of $14,825,474, comparing with $12,890,996 on June 30, 1937. Capital surplus was $4,217,206 against $3,889,584 and earned surplus was $544,879 against $429,887. Funded debt totaled $3,448,000, comparing with $1,997,000 a year earlier.

Current assets as of June 30, 1938, including $2,129,601 cash and U. S. Government securities, amounted to $5,696,345 and current liabilities were $698,636, comparing with cash and U. S. Government securities of $2,192,414, current assets of $5,857,952 and current liabilities of $605,369 on June 30, 1937. Inventories were $1,648,894 against $1,388,522.

Consolidated income account for six months ended June 30, 1938, compares as follows:

	1938	1937
Gross sales	$4,440,733	.....
Costs and expenses	3,766,173	.....
Profit from operations	$ 674,560	$740,629
Depreciation and depletion	138,227	97,277
Operating profit	$ 536,333	$643,352
Other income	47,235	32,060
Total income	$ 583,568	$675,412
Interest	55,191	47,875
Reserve for doubtful accounts, etc.	67,874	34,657
Federal income tax, etc.	65,000	83,000
Net profit	$ 395,503	$509,880

M. H. Baker, president, declared that the present upward trend in building indicates better prospects for the second half of the year. During the first six months of 1938, supplies and raw materials were purchased only for current needs and the company has no purchase contracts at fixed prices that may in the future affect its financial position, Mr. Baker reported.

CELOTEX CORP., and Certain-Teed Products Corp., have entered into an agreement to provide for the use of Certain-teed's excess manufacturing capacity by Celotex at a return of about cost plus 10 percent for 15 years from July 1, 1938. Certain-teed, in turn, is to use the unused manufacturing facilities in Celotex's Metuchen plant. Certain-teed and Celotex are to use jointly the excess manufacturing capacities of American Gypsum Co. at Port Clinton, Ohio, and of Gulf Gypsum Co., both of which are Celotex subsidiaries. Certain-teed is to sell gypsum rock to Celotex as in the mine at 3 cents a ton for rock owned by Certain-teed and the royalty price for gypsum rock on leased property. The agreement is cancellable after July 1, 1940, on six-months' notice.

PENNSYLVANIA GLASS SAND CORP., Lewistown, Penn., reported the following net profit, after depreciation, depletion, interest and federal income taxes, but before federal surtax:

	1938	1937
3 mos. to Mar. 31	$ 70,913	$175,264
3 mos. to June 30	102,405	225,057
6 mos. to June 30	$173,318	$400,321
Earned per share, pfd.	$6.76	$15.47
Earned per share, com.:		
March quarter	$0.08	$0.40
June quarter	0.18	0.56
6 months	$0.26	$0.96

No. of shares: $7 pfd., 25,628 (1937, 25,882); common, 321,860 (1937, 320,590).

ARUNDEL CORPORATION, Baltimore, Md., reported net profit, after depreciation, but before federal income taxes:

Net Profit, after depreciation, etc., before Federal income taxes:	1938	1937
3 mos. to Mar. 31	$204,894	$201,086
3 mos. to June 30	442,033	435,428
6 mos. to June 30	$646,927	$636,514

Quarterly Earnings, per share (in dollars):	1938	*1937	*1936	1935	1934
1st quar.	0.42	0.42(d)	0.24	0.37	0.31
2nd quar.	0.92	0.90	0.74	0.42	0.33
6 mos.	1.34	1.32	0.50	0.79	0.64
3rd quar.	0.57	0.76	0.45	0.54	
9 mos.	1.89	1.26	1.24	1.18	
Year	1.68	1.30	1.24	1.51	

No. of shares, 483,851.

*Interim earnings are before Federal taxes.

Note: Fourth quarter earned per share not computed due to year-end adjustments.

STANDARD SILICA CORP., Chicago, Ill., has reported the following earnings for the six months to June 30, 1938:

Gross profit after deprec. & deplet.	$24,020
Selling, etc., expenses	21,715
Operating profit	2,305
Other income	691
Total income	2,996
Federal income taxes (est.)	449
Net profit	2,546
Earned per share	$0.02

Net profit, 6 mos. to June 30, 1937, totaled $61,255, equal to $1.56 per share.

CONSOLIDATED ROCK PRODUCTS Co., Los Angeles, Calif., will be reorganized, a plan having been approved by Federal District Judge Harry A. Hollzer. The company has been operated under 77B proceedings since May, 1935.

MOLINE, ILL.: Moline Consumers' Co. has been awarded a contract by the city council to furnish materials for repaving one of the city's streets. The total bid was $39,966.78. The improvement is a WPA project with the city furnishing the materials, payment to be made from the city's share of the state gasoline tax.

Obituaries

ROBERT C. BURNSIDE, president and founder of the Asbestolith Manufacturing Co., New York, N. Y., and formerly interested in the Maine and New Hampshire Granite Co., died August 3 at the age of 71.

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DR. FRANK BAKER, president of the Baker Stone Co., Bloomsburg, Penn., and a prominent dentist, died recently at the age of 57. A brother, Creveling Baker, is general manager of the stone company.

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WALTER E. HART, for a number of years office manager of the Portland Cement Association at Kansas City, Mo., died after an illness of several months. He was a graduate of the University of Illinois, and was a member of the American Society of Civil Engineers.

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DAVID L. FRANK, a director of the Coplay Cement Manufacturing Co., Coplay, Penn., died suddenly from a heart attack. Mr. Frank was prominent in Democratic politics.

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JOHN O. GREENWAY, formerly chief engineer of the Washington Brick, Lime and Sewer Pipe Co., Spokane, Wash., died at his home in Owosso, Mich., where he had returned to live after he retired from active service.

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ALEXANDER C. BIRNIE, who was active in the affairs of the National Sand and Gravel Association for some time, is dead. He was 61 years old. In 1907, he became associated with the Adams and Ruxton Construction Co., and in 1913 organized the Birnie Sand and Gravel Co., with a plant at North Wilbraham, Mass. The name of the company was later changed to Birnie Co., Inc.

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CAPTAIN JOHN HARBOLDT, veteran master of the Kelley Island Lime and Transport Co., sandsucker, Hydro, died recently in Cleveland, Ohio.

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ELLSWORTH J. JOHNSON, aged 77, president of the Knickerbocker Slate Corp., New York, N. Y., until his retirement in 1930, died recently at Westfield, N. J. He was also owner of quarries in Vermont.

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ERASTUS GREEN, general manager of the Spruce Pine Mica Co., Spruce Pine, N. C., died August 7. He was widely known in the mica mining industry.

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DR. W. O. LAWRENCE, for a number of years medical director of the Universal Atlas Cement Co., Leeds, Ala., died at the age of 58.

MRS. CLARA HARDING, co-owner of the Harding & Coggswell Stone Co., Ellettsville, Ind., and widow of Alfred G. Harding, veteran limestone quarry operator, died recently at the age of 61.

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GEORGE E. SUTHERLAND, president of the West Virginia Sand & Gravel Co., Charleston, W. Va., and for 18 years identified with the sand and gravel business, died August 12 at the age of 61. He was also identified with the Standard Brick and Supply Co., and was active in civic affairs.

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OSCAR J. WESTFALL, owner and operator of sand and gravel pits at Syracuse, N. Y., died on August 3. Mr. Westfall had been in failing health since the first of the year.

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Loses Life In Airplane Accident

H. C. MILLER, who was well known in the sand and gravel business throughout the South, lost his life in an airplane accident. Flying was a hobby with Mr. Miller, who had owned and operated his own plane for a number of years to travel between the various properties in which he was interested. He and his brother, H. S. Miller, had been to the Gulf Coast for a fishing trip, and took off from the airport at Houma for Monroe, La., on the afternoon of August 9. After being missing for 30 hours, their charred bodies were found in the wreckage of the plane near Woodville, Miss. Mr. Miller was plant manager for the Monroe Sand and Gravel Co., Monroe, La., and owner of the Fair River Sand and Gravel Co., Wanilla, Miss. He was also associated with the Holloway Gravel Co. for a number of years, and continued to do a great deal of location and advisory work. Considered an authority on gravel and sand in the South, he was frequently called upon as an appraiser of properties. Last year, Mr. Miller was secretary-treasurer of the Mississippi Sand & Gravel Association.

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Robert F. Bunting, president of the Black Donald Graphite Mining Co., Calabogie, Ont., Canada, died July 17 at the age of 72. Bunting was a native of Nashville, Tenn.

CONKLIN & SONS CO., Madison, Wis., has placed in operation new sand and gravel washing and screening equipment. This company, which has been a local ice, fuel, and building material dealer, recently purchased a sand and gravel pit, and now has in service plant facilities with a capacity of 150 tons of sand and gravel per eight-hour day. Leo Stoppleworth, a veteran quarry operator, is superintendent of the pit.

Prices Bid—Contracts Let

GLENS FALLS, N. Y.: Five bids were received by the county superintendent to furnish 13,750 tons of crushed stone for use in the construction of the Glens Falls-Corinth road in Luzerne. The bids were taken under consideration and are as follows: Jointa Lime Co., Glens Falls, $1.10 a ton f. o. b. trucks at the quarry; J. J. Fredella Co., Glens Falls, $1.10 a ton, f. o. b. trucks at the quarry; Polsan Crushed Stone Co., Saratoga Springs, $1.10 a ton, f. o. b. trucks at the quarry; Warren Bros. Road Co., Corinth, $1.50 a ton, f. o. b. trucks at the quarry, Corinth; Kellam and Schaffer Co., Schenectady, $2.20 a ton, f. o. b. trucks at the quarry at Corinth.

CLEVELAND, OHIO: Cleveland Builders Supply Co. has received orders from the federal government in July exceeding $1,500,000 for sand, slag, concrete and cement.

BARNESVILLE, OHIO: The city council has awarded the contract for furnishing crushed limestone for the street department to J. Campbell at $1.25 per ton.

CIRCLEVILLE, OHIO: Sturm and Dillard, Circleville, has the contract to furnish gravel for bituminous surfacing on state route 374.

GIBSONBURG, OHIO: County commissioners have authorized the purchase of 3000 tons of crushed stone at 90c per ton, f. o. b. the Wagner quarry at Castalia, Ohio. The stone will be used for road construction.

SPRINGFIELD, ILL.: McGrath Sand and Gravel Co., Lincoln, Ill., has submitted a bid to the city to furnish gravel at $1.42 per ton, to be used in laying oil mat streets. The city had in the past used stone chips for this type of work but rejected recent bids, claiming they were too high. An experiment was to be made by the city to determine the relative merits of the two materials when used in this type of street construction.

IOWA: Union county board of supervisors has approved an agricultural liming program and has entered into a contract with the Concrete Materials Co., Cedar Rapids, to furnish lime dust from its quarry at Grand River. The contract provides for a base price of 94c per ton plus haulage and county expenses, which will allow placing of stone on farms within 20 miles of the quarry for about $1.70 per ton. Lucas county has signed contracts with two quarries to furnish agricultural stone at 99c per ton plus a ton-mile hauling charge of 3.25c.

Cinder Concrete Convention

(Continued from page 64)

of time. He believes that the industry is faced with the problem of giving consideration to raising the strength requirement for load-bearing block because of the interrelation of strength with durability and that curing methods should be selected accordingly.

Volume change was given as a very important point to consider in selecting a method of curing, since volume change, and subsequent cracking in the completed wall, is one of the biggest sales obstacles with which the industry is confronted.

The second part of Mr. Woodworth's address concerned itself with comparisons of four types of curing—air curing, moist curing in yard storage, moist curing under covered storage and high pressure steam curing. These methods were rated as to their effects on manufacturing and quality considerations and their rating, in Mr. Woodworth's belief, are as 1: 2: 2¼: 4 in that order.

Professor Duff Abrams, New York, had a paper, "Gradation of Aggregates and Methods of Tests" and R. L. Rogers, concrete engineer, Washington, D. C., spoke on "Standards of Quality." This session concluded with the report of the standards committee and the report of the trade name committee. Both of these reports were referred to the members for vote.

Federal Housing Program

The group then held a luncheon and was formally welcomed to Atlantic City by Charles D. White, mayor. The following session was largely taken up by the Federal Housing Administration. Leo A. Kirk, director of F. H. A., Eastern Pennsylvania and Delaware, and William P. Carson, financial relations manager, F. H. A., discussed Title 1 and Title 2 of the Act, laying particular stress to the application of Title 1 to the cinder block industry. Other papers presented were: "Philadelphians at Home" by W. F. Koelle, architect, Philadelphia, and "Home Builders' Association of Philadelphia and its Relation to the Cinder Block Industry" by Carroll Shelton, executive secretary of the Home Builders' Association of Philadelphia. R. Loran Langsdale, Baltimore, Md., then told of progress being made by the "News," the official publication of the National Cinder Concrete Products Association.

The last morning meeting was featured by reports on progress of the cinder block industry in various parts of the country. John C. Chenery, Mahlstedt Materials, Inc., New Rochelle, N. Y., newly-elected vice-president of the Association, gave a brief summary of the progress cinder concrete masonry had made in New York; Charles W. Akers, Nashville Breeko Block and Tile Co., Nashville, Tenn., reported for that territory; and J. W. Warren, Southern Cast Stone Co., Knoxville, Tenn., summarized conditions in Knoxville.

Progress of the program of wall tests now being conducted by the U. S. Bureau of Standards in Washington, D. C., and the effect that these tests will have on the industry were reviewed by E. W. Dienhart. Lloyd W. Weed read P. W. Woodworth's paper on "Need for More Equitable Fire Insurance Rates on Cinder Masonry Construction," and L. P. Smithey, Director, State Board for Certification of Architects and Engineers, Roanoke, Va., spoke on "The Need for a Certified Engineer in a Cinder Block Plant."

The next meeting of the Association is to be held in Chicago in February at the same time that the National Concrete Masonry Association holds its annual convention in coöperation with the Concrete Industries Exposition.

The BROOKS-TAYLOR Lime Putty Plant

IN HARRISBURG

This plant is a complete unit for producing and handling aged lime putty by the Brooks - Taylor method. Lime is slaked under thermal control, screened and pumped to aging tanks where excess water is removed by special filters. The Pennsylvania Supply Co. provides contractors and builders in Harrisburg with a ready-mixed mortar service and aged lime putty for plaster from it. This eliminates the necessity of slaking and aging lime on the job. Write our nearest office for information on the Brooks-Taylor process or a quotation on a standard plant.

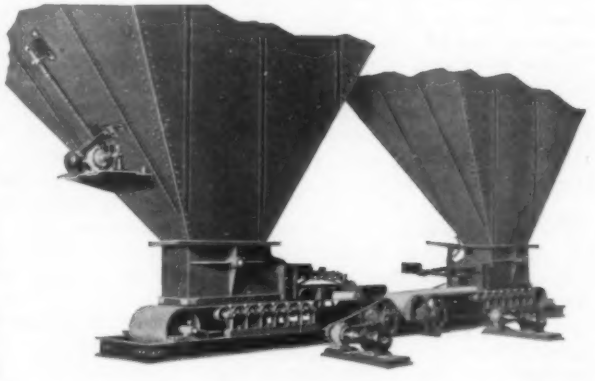
Standard Brooks-Taylor plant with lower portion enclosed for winter operation.

CHICAGO BRIDGE & IRON COMPANY

Chicago....2452 Old Colony Bldg.
New York.3396-165 Broadway Bldg.
Cleveland...2285 Rockefeller Bldg.
Detroit.....1553 LaFayette Bldg.
Dallas.....1487 Liberty Bank Bldg.
Birmingham.....1505 N. 50th Street
Tulsa.....1650 Hunt Bldg.
Houston.....2919 Main Street
Philadelphia...1651-1700 Walnut St.
Boston.....1564 Consol. Gas Bldg.
San Francisco....1093 Rialto Bldg.
Los Angeles....1458 Wm. Fox Bldg.

Plants at BIRMINGHAM, CHICAGO and GREENVILLE, PA.

Church Patented VOLUMETER



The proportioning of the raw materials—sand, cinders, gravel, etc., with the binders—lime, cement, etc., to make a perfect product is very important from the standpoint of the physical proportions of the brick, block, etc., and from economical operation. The Volumeter, as shown, is used in connection with the Rod Mill, insuring a perfect mix with a low cost of operation and perfection. Write for further information.

JACKSON & CHURCH CO. SAGINAW MICHIGAN

Wisconsin Sand and Gravel Producers Organize

PRODUCERS OF SAND AND GRAVEL in Milwaukee county, Wisconsin, and adjoining territory shipping into Milwaukee county have formed the Materials Coöperative Association, a central sales organization. The Association was chartered by the State of Wisconsin on July 7 and started business on August 1, with members already signed up who represent 75 percent of the production shipped into that area.

Wisconsin producers had been operating under a state law called the "Little NRA," which expired in July, 1937, and apparently, judging from what has taken place since, it was effective to a certain degree in stabilizing prices of aggregates. The law was reënacted by a special session of the legislature in the fall of 1937 and evidently is intended for "service industries" only.

At any rate, whether eligible or not to again operate under terms of the Wisconsin Recovery Administration, producers of aggregates did not choose to operate again under its jurisdiction. Instead the Wisconsin Mineral Aggregates Association, a state-wide organization of crushed stone and sand and gravel producers was again revived to fill the need for some organized activity and is now functioning satisfactorily. This association is likely the only state group excepting Indiana (ROCK PRODUCTS, June, 1938, p. 41) which combines crushed stone and sand and gravel producers in its membership.

Since the beginning of the year prices of sand and gravel and stone have dropped about 30 percent in Milwaukee county and are back to the 1932 price level, according to N. K. Wilson, executive-secretary of the Wisconsin Aggregate Association. Much of the drop is credited to the activities of truckers with price-cutting tactics and excessive costs of distribution brought about by over-lapping hauls. Consequently the Materials Coöperative Association was formed in an effort to stabilize prices and to secure for its members economies and efficiency in their selling effort. The idea is not new, having been tried in 1929 and 1931.

In the coöperative marketing of aggregates through a central sales organization, the business is to be allotted on the basis of past performance. The percentage of materials sold in Milwaukee county by any one producer for a year, based on 1930 to 1937 averages, will be the percentage volume of total sales allotted to that producer. In this way it is hoped that considerable economy will result to each member by allotting business according to the length of haul and by cutting the costs of sales. The actual cost of operation of the Association will be prorated and deducted from the sales price, but is not to exceed a maximum of 5c per ton.

The state coöperative marketing law under which the selling organization is to operate has teeth and provides penalties for breach of agreement. In event of a direct sale by a member, he is required to pay a fine amounting to 30 percent of the price received for the material in question as liquidated damages; and it is provided that a defaulting member may be enjoined from doing business.

The terms of the existing contract expire on March 31, 1939, so that the members will have an opportunity to withdraw before the 1939 construction season, if they are not satisfied with its performance. The Association functions as a corporation, has a board of directors, and with a three-fourths majority of the Board can vote to disband.

N. K. Wilson is manager of the Association; H. Jaeger is president; O. W. Lutz, secretary-treasurer; and W. Patitz, vice-president.

Mineral Industries Conference

ILLINOIS MINERAL INDUSTRIES CONFERENCE, previously scheduled to be held at Urbana, Ill., on September 30 and October 1, has been postponed so as to coincide with the date of dedication of the Natural Resources Building to be constructed soon on the University of Illinois campus, by the Department of Registration and Education and the Public Works Administration.

A COMPREHENSIVE EXHIBIT of new and improved products is planned for the thirteenth National Exposition of Power and Mechanical Engineering to be held at the Grand Central Palace, New York, during the week of December 5 and 10. More than 230 manufacturers have engaged space.

A. L. BOWMAN, Albany, Ore., has been authorized by the Oregon State Land Board to operate a sand and gravel business, extending from the foot of Denver street to a point 1000 ft. down the Willamette river. The crushing plant is located outside the Albany city limits. The board also renewed the lease of the Albany Sand and Gravel Co.

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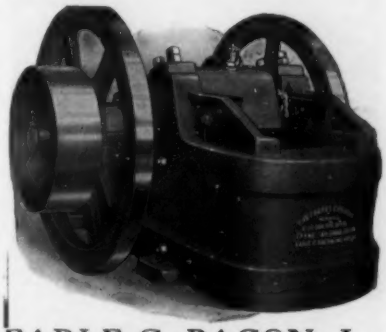

EARLE C. BACON, Inc.
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Reconstructing Cement Plant

LEHIGH PORTLAND CEMENT CO., Allentown, Penn., has started preliminary work toward reconstruction of its cement plant at Alsen, N. Y. According to recent reports the old buildings are being razed and engineers are engaged in re-designing the transportation facilities from the quarry to the mill. This plant, which has been idle for many years, is scheduled to resume operations in about eight months. Estimated cost of the reconstruction just started is about $2,500,000.

The Right Idea

OLMSTED COUNTY, MINN., commissioners recently voted to sell no more rock produced by its large crusher, upon protest of a commercial producing plant. Fifteen employes of the Gale Patterson privately-owned quarry appeared before the commissioners with the plea that the county stop competition with private industry. We'd like to hear some more news like this.

Protests Levy

CONSOLIDATED CEMENT CORP., Chicago, Ill., at a recent hearing held at Topeka, Kan., protested valuation of the cement plant owned by the corporation at Mildred, Kan. This plant is being razed and some of the equipment has been transferred to the plant at Fredonia, Kan. The valuation has already been reduced from over $200,000 to $75,000.

Sand-Lime Bricks Production and Shipment

Eight active sand-lime brick plants reporting for July and nine for June, statistics for which were published in August.

Average Price for July

	Plant Price	Delivered Price
Minneapolis, Minn.	$ 9.50	.....
Mishawaka, Ind.	10.00	.....
Milwaukee, Wis.	10.00	12.50
Syracuse, N. Y.	14.00	$16.00 C/L 20.00 L/C
Saginaw, Mich.	11.00	.....
Flint, Mich.	11.65	13.15

Statistics for June and July

	June†	July‡
Production	1,908,975	1,887,112
Shipment (rail)	45,500	271,950
Shipment (truck)	1,612,856	1,559,940
Stock on hand	1,185,271	1,185,024
Unfilled orders	400,000	960,000

†Nine plants reporting; incomplete, six not reporting unfilled orders and two not reporting stock on hand.

‡Eight plants reporting; incomplete, three not reporting unfilled orders and two not reporting stock on hand.

COLD SPRING GRANITE CO., Cold Spring, Minn., has announced considerable improvements to be made in its plant.

COLUMBIA CONCRETE PIPE CO., Wenatchee, Wash., which is associated with the Yakima Cement Products Co., Yakima, Wash., is building a new sand and gravel plant at Wenatchee.

LAMONT AND YOUNG, White Salmon, Wash., manufacturers of a patented interlocking concrete tile, are reported to be in active operation producing the units. Architects have shown interest in the product and the owners of the plant have received numerous inquiries from other cities.

Portland Cement Statistics

PORTLAND CEMENT INDUSTRY in July, 1938, produced 10,967,000 bbl., shipped 10,163,000 bbl. from the mills, and had in stock at the end of the month 23,271,000 bbl., according to the Bureau of Mines. Production and shipments for the month showed decreases of 5.4 and 16.9 percent, respectively, as compared with July, 1937. Portland cement stocks at mills were 0.4 percent lower than a year ago.

The statistics here given are compiled from reports for July, received by the Bureau of Mines, from all manufacturing plants except one, for which estimates have been included in lieu of actual returns.

In the following statement of relation of production to capacity the total output of finished cement is compared with the estimated capacity of 160 plants at the close of July, 1937, and 161 plants at the close of July, 1938.

RATIO (PERCENT) OF PRODUCTION TO CAPACITY

	July 1937	July 1938	June 1938	May 1938	April 1938
The month	53.1	50.2	49.8	47.4	37.7
The 12 months ended	47.8	40.8	41.0	41.3	41.8

Concrete Pavement Yardage

AWARDS of concrete pavement for July, 1938, have been announced by the Portland Cement Association as follows:

Type of construction	Sq. yds. awarded during July, 1938	Total sq. yds. for year to date July 30, 1938
Roads	3,511,369	21,502,214
Streets	1,618,834	7,523,885
Alleys	63,541	355,624
Total	5,193,744	29,381,723

CARBON LIMESTONE CO., Hillsville, Penn., recently was host to 380 Geauga county farm people at its plant, as part of an educational farm tour. The stone company demonstrated to the group how agricultural stone was produced and provided entertainment for the women.

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Aggregate Plants Showing More Activity

Another Tennessee Sand Pit Opens

SOUTHERN SAND Co., Evansville, Ind., recently received the first carload of sand from a pit of what is believed to be unusually good building and molding sand material located on the U. G. Butler farm, 1½ miles south of McKenzie, Tenn. The deposit covers an area of five acres, under 18 ft. of overburden, and the sand is said to be at least 20 ft. deep.

Large Michigan Gravel Order

DON SCHENK AND THE CHAPMAN GRAVEL Co., operating gravel pits a mile north and two miles east of Durand, Mich., in Vernon township, have secured an order for 155,000 tons of gravel for a government project in Flint, Mich. The companies also have an order for 21,000 cu. yd. of gravel for use in paving the new route of M-71 between Durand and Corunna. Both are wet pit operations, using dredges for excavation.

To Use Rock Asphalt

OKLAHOMA has suspended its entire 1939 federal highway construction until late next spring in order to be able to participate in the $2,500,000 rock asphalt resurfacing program proposed by the federal government. Under the proposed program only rock asphalt can be used. Southern Rock Asphalt Co., Oklahoma City, is the only concern in the state that can produce it. The entire program, which will be a WPA project, will require the production of $1,380,825 worth of the material.

Agstone On Large Scale

CLARKSVILLE LIMESTONE Co., Clarksville, Tenn., a new concern, has started production of agricultural limestone at the recently completed plant on Highway 13. The new plant has a daily capacity of 250 tons of material, the stone being pulverized by a hammer mill driven by a 125-hp. motor. It is expected that the plant will be operated the year-round with about 25 employes. A. W. Partee, A. M. Andrew and W. H. Petri, owners of the Hopkinsville Stone Co., Hopkinsville, Ky., are the heads of the new company.

Again in Operation

COLORADO FUEL AND IRON CORP., Monarch, Colo., quarry has resumed operations after a shutdown since early winter. Shipping of limestone was made necessary by heavy orders received at the Pueblo steel works.

AUDLEY WALKER, Clay Center, Kans., has announced that he has opened up a new sand plant on the Ned Engler farm about 800 ft. south of Highway 24, near Republican river. A modern plant will be erected.

GLENS FALLS, N. Y., will revive operation of a stone quarry following presidential approval of an allotment of $30,066 in WPA funds for that purpose. The stone is to be used on local WPA projects.

WILLIAM FLYNN, Santa Monica, Calif., contractor, has started construction of a $50,000 plant for the handling of crushed rock, sand and gravel at Corona, Calif.

THE FRANCE LIMESTONE Co., Toledo, Ohio, has purchased the Mt. Vernon Sand and Gravel Co., with a plant at Fredericktown, Ohio. It is planned to continue operation of the sand and gravel company under the old name.

LEHIGH PORTLAND CEMENT Co., Metaline Falls, Wash., has made changes preparatory to manufacturing modified portland cement for the Coulee dam. Iron ore from the Oriole mine will be used in place of some of the alumina.

YAKIMA SAND & GRAVEL Co., Yakima, Wash., is seeking to reorganize the company under 77B proceedings. The case has been pending since May 6. In the reorganization plan, creditors are divided into six classifications. If the plan, which has been agreed upon by at least two-thirds of the creditors in each classification, is confirmed, the stock will pay 5 percent dividends and will be held by the Guaranty Trust Co. as trustees.

New $1,000,000 Wallboard Plant

NATIONAL GYPSUM Co., Buffalo, N. Y., has placed a contract with the George H. Fuller Corp., to construct a $1,000,000 wallboard plant at Savannah, Ga. It is planned to start construction September 1, and it will be completed about January 1, 1939. Reports also state that the company will expand the local gypsum plant recently purchased at Medicine Lodge, Kan. The plant now has a capacity of 400 tons daily.

Buys Clinker Coolers

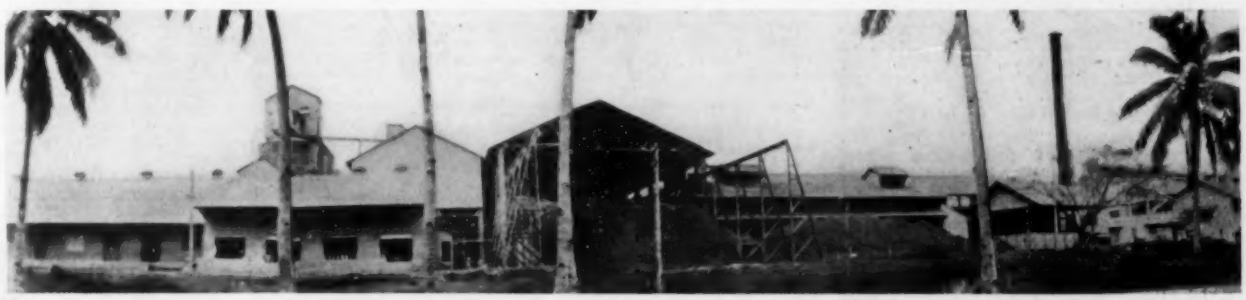
KEYSTONE PORTLAND CEMENT Co., Philadelphia, Penn., has purchased two 1500-bbl. clinker coolers of the air quenching type from the Fuller Co., Catasauqua, Penn.

Cement Plant Improvements in the Philippines

CEBU PORTLAND CEMENT Co., Naga, Cebu, P. I., owned by the Philippine government, is making some extensive improvements to the plant, a contract for $153,000 in machinery having been placed with Earnshaw Docks and Honolulu Iron Works in Manila, agents for Allis-Chalmers Manufacturing Co., Milwaukee, Wis.

This contract includes: a 10- x 11- x 175-ft. rotary kiln complete with motor; an air quenching cooler, 4½ ft. wide by 55 ft. long; a 7- x 26-ft. raw grinding compeb mill and a 7- x 26-ft. clinker grinding compeb mill, both of which will be directly driven by 500-hp. Allis-Chalmers motors.

New equipment being supplied will increase annual production by approximately 450,000 bbl. It is a wet-process plant, the original equipment for which was furnished by Allis-Chalmers.



Wet process cement plant of the Cebu Portland Cement Co., Naga, Cebu, P. I., which will increase annual capacity by 450,000 bbl.

TRAFFIC and TRANSPORTATION

Proposed Rate Changes

THE FOLLOWING are the latest proposed changes in freight rates up to and including the week of August 13:

Central

54325 (W. T. L. Appln. E-55-11, as corrected)—To establish on **vermiculite**, other than crude, C. L., min. wt. as shown below: In cars not over 40 ft. 6 in. in length, 16,000 lb.; in cars over 40 ft. 6 in. and not over 41 ft. 6 in. in length, 18,720 lb.; in cars over 41 ft. 6 in. and not over 42 ft. 6 in. in length, 19,520 lb.; in cars over 42 ft. 6 in. and not over 46 ft. 6 in. in length, 22,720 lb.; in cars over 46 ft. 6 in. in length, 25,920 lb.; from points in Official territory to points in W. T. L. territory, also between points in W. T. L. territory and points in S. W. F. B. territory, Class 37½ rating.

54379 (2). To establish on **gypsum blocks, planks or slabs**, reinforced or not reinforced with metal, with or without metal ends and sides; **plasterboard**, in straight C. L. or in mixed C. L. with plaster; **plaster, calcined** (stucco, plaster of paris); **plaster, wall; rock gypsum**, ground (land plaster), C. L., min. wt. 40,000 lb.; from Gypsum and Port Clinton, O., to Ameagle, Cabin Creek Jct., W. Va., Carver, Ky., 20c; Elkhorn City, 21c; Hitchins, 19c; Jenkins, Ky., 21c; Kayford, Kingston, W. Va., 20c; Marrowbone, 21c; Morehead, Mt. Sterling, Paintsville, Pikesville, Ky., Pratt, W. Va., Prestonburg, Royalton, Ky., 20c; Shelby, 21c; Van Lear, Wayland, Ky., 20c, and Wheelwright, Ky., 21c.

55174. Establish on **cinders, clay or shale** (haydite), C. L., Cleveland (Willow), Ohio, to Clarksburg, W. Va., 264c per net ton, via B. & O. R. R. direct.

55178. Establish on **slag**, crushed or crushed commercial, in open top cars, C. L., Jackson, Ohio, to Wayne, W. Va., 132c per net ton via D. T. & I. R. R., Glen Jean or Ironton, Ohio, N. & W. Ry., to expire Sept. 30, 1938, unless sooner canceled, changed or extended.

36911 (Sup. 1). **Fluxing lime**, having no commercial value for building or chemical purposes, C. L., min. wt. 60,000 lb., to Brackenridge, Penn., from York and Thomasville, Penn., $2.10 per net ton, and from Annville, Penn., $2.31 per net ton.

M-3846 (increase). To cancel from W. S. Curlett's I. C. C. A-573, Item 3830, rates on **chemical limestone**, C. L., from points on the Penn Railroad in Penn., to Carnegie, Oakdale and Noblestown, Penn., class rates to apply. Reason—No present or prospective movement. (334-C)

M-3847 (increase). To cancel from W. S. Curlett's I. C. C. A-573, Item 3640, rates on **stone**, natural, viz., crushed, coated with oil, tar or asphaltum (See Note 2), from Little Falls, N. Y., Martinsburg, W. Va., and Utica, N. Y., to Forsyth, Conewango, N. Y., and Shaw Junction, Penn., class rates to apply. Reason—No present or prospective movement. (339-C)

M-3850 (increase). To cancel from Agent Hecker's I. C. C. 213, Item 2945-A, rate of $4.18 per net ton on **sand, silica**, C. L. (See Note 1), from Victoria, Va., to Chicago, Ill., class rates to apply. Reason—No present or prospective movement. (319-C)

36949. **Crushed stone**, coated with oil, tar or asphaltum, in open cars, and uncoated (See Note 1), from Honesdale, Penn., to various points in the state of Penn., rates ranging from $1.21 to $1.65 per 2000 lb. on uncoated stone and $1.32 to $1.79 per 2000 lb. on coated stone. Reason: On basis of Buckland scale.

Sup. 1 to WDA 53513. Cancellation. White Docket Advice 53513, Docket Bulletin 2890, dated Jan. 4, 1938, proposal cancel present rates on **limestone**, ground or pulverized, or **limestone**, dust, unburnt, and

55303. Establish on **crushed stone**, C. L., Huntington, Ind., to Woodburn, Gar Creek and New Haven, Ind., 55c per net ton, via Wab. Ry. direct.

55304. Establish on **agricultural limestone** (ground or pulverized); **agricultural limestone meal; agricultural limestone screenings**, C. L., min. wt. 50,000 lb., Piqua, Ohio, to Harrison, Ohio, 154c per net ton.

55312. Establish on **fluorspar**, C. L., min. wt. 60,000 lb., from Colo. common points, viz., Boulder, Canon City, etc., North Gate, Colo., to points in Official territory, joint through specific commodity rates on same basis presently applicable from Lordsburg and Deming, N. M., to representative points as follows: Detroit, Mich., Cleveland, Ohio, Youngstown, Ohio, Lackawanna, N. Y., and Pittsburgh, Penn., $11.22 per net ton, Bethlehem, Penn., Baltimore, Md., Wilmington, Del., Philadelphia, Penn., and New York, N. Y., $12.54 per net ton.

55319. Amend commodity description, covering **gravel, slate** and **stone**, crushed or ground, in straight or mixed C. L., from Danville, Ill., to Brantford, Ont., Cold Brook, N. B., Hamilton, Ont., Highlands, Que., Montreal, Que., by addition of "brick, crushed or ground." **limestone** (not industrial), in box cars, in straight C. L., Chicago, Ill., to pts. in Mich. and South Bend, Ind., published Item 1340-A C. & O. Ry. Trf. 2252-F, and other individual lines' tariffs, hereby cancelled from the docket.

55200 (1). Establish **sand**, moulding, C. L., E. & O. V. Ry. stations, viz.: Briscoe, Fairview, Feigels Siding, Green River Road, Hatfield, Kensington, Kincaid, McCoy, Newburgh, Richland, Rockport, Sandale, Stacer and Vanada, Ind., to E. St. Louis, Ill. (for beyond), 177c per net ton, via E. & O. V. Ry., Evansville, Ind., L. & N. R. R.

55201 (2). Establish **lime**, common, hydrated, quick or slacked, C. L., Detroit, Mich., to Troy, Ohio, 15c min. wt. 30,000 lb., 12c, min. wt. 50,000 lb., via P. M., Toledo, B. & O.; P. M., Toledo, C. C. C. & St. L.; P. M., Toledo, C. & O., Carey, C. C. C. & St. L.; P. M., Toledo, C. & O., Marion, C. C. C. & St. L.; P. M., Toledo, N. Y. C., Martel or Edison, C. C. C. & St. L.; P. M., Toledo, N. Y. C., Kenton, C. C. C. & St. L.

55281 (1). Cancel present proportional rates on **crushed granite; stone**, crushed or broken; **stone**, riprap, and **stone**, screenings, C. L., published on page 40 of P. R. R. Trf. 1859, Milwaukee, Wis., across lake (via car ferry) to destinations in Michigan and Toledo, Ohio, and similar rates in other individual lines' tariffs. Classn. basis to apply.

55233 (1). Establish **crushed stone, also lime** (not industrial), in bulk, in open top cars only, C. L., LaGro, Ind., to Pontiac, Mich., 160c per ton, via Wab. Ry., Detroit, Mich., G. T. Ry.

Trunk

36387. **Crushed stone and screenings**, in straight or mixed C. L. (will not include agricultural limestone or ground limestone unburnt; fluxing stone or firestone; or stone, coated with oil, tar or asphaltum), (See Note 3), from Monocacy, Penn., to Grottoes, Va., $2.10 per net ton, in lieu of present 6th class rate 24c per 100 lb.

36658. **Sand** other than ground or pulverized or naturally bonded molding, and **gravel**, in open top cars, without tarpaulin or other protective covering, C. L., from Lake Junction, N. J., to West Chester, Kennett Square and Glenolden, Penn., $1.60 per net ton, Oxford, Penn., $1.70 per net ton, in lieu of present class rates. Reason—Reflect Lycoming scale increased under Ex Parte 115.

36681. **Gravel, sand, slag and crushed stone**, coated with oil, tar or asphaltum** in bulk, in open top equipment, in straight C. L. (see Note 3), various rates from Greer, W. Va., to various stations on the P. & L. E. R. R., Wn. Md. Ry., P. C. & Y. Ry., Montour R. R. and Monongahela Ry.

36771. **Phosphate rock** (other than ground phosphate rock, slush and floats), (refuse and washings from phosphate rock), and soft phosphate, C. L., min. wt. 80 percent of marked capacity of car, except that actual weight will govern where cars are loaded to their full visible carrying capacity and the actual weight is less than 80 percent of the marked capacity, but in no case less than 60,000 lb. Ground phosphate rock, slush and floats (refuse and washings from phosphate rock), and soft phosphate, not acidulated nor ammoniated, in bags or in bulk, C. L., min. wt. 80 percent of marked capacity of car, except that actual weight will govern where cars are loaded to their full carrying capacity and the actual weight is less than 80 percent of the marked capacity, from Dunellon, Fla., to Ambler, Penn., $8.06 per gross ton, in lieu of present rate $9.11.

36995. **Sand**, common or building (not industrial), C. L. (See Note 3), from Boonville and Alder Creek, N. Y., to Elmira, Elmira Heights, Horseheads, Big Flats, Painted Post, Coopers, Campbell, Savona, Bath, Kanona, Avoca, Wallace, Cohocton, Atlanta and Wayland, N. Y., $2.09 per net ton, in lieu of present commodity rates, per N. Y. C. R. R. Tariff I. C. C. 16762. Reason: Reflect joint Lycoming scale extended to Wayland, N. Y., including Ex Parte 123 increases clearing intermediate origins and destinations.

36999 (increase). To cancel rates on **gypsum**, crushed, and **gypsum rock**, etc., from Akron, Oakfield, Wheatville, Clarence Centre, Transit, Syracuse and Newburgh, N. Y., to points in Trunk Line territory published in N. Y. C. R. R. I. C. C. Nos. 16709, 16762, 16759, 17002, 16771, 16739, 16776, 16754. Class rates to apply. Reason: No present or prospective movement.

37000. **Crushed stone**, C. L., from Northampton, Penn., to stations on the Lehigh Valley R. R. Reason: Rates reflect joint Lycoming scale increase.

37009 (increase). To cancel charges for handling **cinders, crushed stone, gravel, unburned ground limestone, wet feed and sand** from boats to cars at Port Morris, N. Y., per N. Y. C. R. R. I. C. C. 15454. Reason—No present or prospective movement.

Sup. 2 to 36931. **Fluxing lime**, not ground, in bulk, C. L., min. wt. 70,000 lb., to Bethlehem, Penn., from Cavetown, Md., $2.42 per net ton and from York, Bittinger and Thomasville, Penn., $2 per net ton.

36971 (increase). To cancel from N. Y. O. & W. Ry. Tariff I. C. C. 10041, Supplement 27, rates on **sand and gravel**, C. L., from Durhamville, N. Y., Solsville, N. Y., and Sherburne 4 Corners, N. Y., to various destinations in Trunk Line territory; also rates on **stone**, broken or crushed, not coated with oil, tar or asphalt, C. L., from Solsville, N. Y., to various destinations in Trunk Line territory, class rates to apply. Reason—No present or prospective movement.

3689 (increase). **Stone**, broken or crushed, C. L. (See Note 3), from Oriskany Falls, N. Y., to Fayetteville, Manlius, Oran and Cazenovia, N. Y., $1.32 per net ton in lieu of present $1.21 per net ton. Reason: Reflects Lyoming scale for distance via Oneida, N. Y.

36982. **Gravel and sand**, C. L. (See Note 3), from Fish Creek and Sylvan

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*Note—The oil, tar and/or asphaltum not to exceed 10% by weight of the commodity shipped, the shipper to so specify on shipping orders and bills of lading.

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

Beach, N. Y., to Manlius, N. Y., $1.21 per net ton in lieu of present 1.54 per net ton, per N. Y. O. & W. Ry. I. C. C. 10041, Supplement 27. Reason: Reflects Lycoming scale for distance via Oneida, N. Y.

36983 (increase). **Limestone**, ground or pulverized, C. L., from Oriskany Falls, N. Y., to Fayetteville, Manlius and Oran, N. Y., $1.43 per net ton and to Cazenovia, N. Y., $1.49 per net ton in lieu of present rate to Fayetteville $1.38, to Manlius and Oran $1.32 and to Cazenovia $1.21 per net ton. Reason: Reflects I. C. C. Docket 25220 scale for distances via Clark Mills and Oneida, N. Y.

36989. **Limestone**, ground, C. L., min. wt. 60,000 lb., from Tex. and Cockeysville, Md., to Toronto and Brantford, Ont., 28c, Cornwall, Ont., 31c, Granby and Montreal, Que., 36c and Sherbrooks, Que., 38c, in lieu of present 6th class. Reason: Compares favorably with rates from other Trunk Line shipping points.

M-3857 (increase). To cancel from Agent W. S. Curlett's I. C. C. A-573. Item 9415, rates on **soapstone**, broken or crushed, in bulk, also talc, C. L., from eastern basing points to Canadian points taking rate basis 76-D, 78-D and 100-B, class rates to apply. Reason: No present or prospective movement.

36911 (Sup. 2). **Fluxing lime** (not industrial), C. L., min. wt. 60,000 lb., from Hellam, Campbell, York County, and York, Penn., to Brackenridge, Penn, $2.10 per net ton in lieu of present $2.42 net ton. Reason—Same as in effect to Butler and Vandergrift, Penn.

36931 (Sup. 1). **Fluxing lime**, not ground, in bulk, C. L., min. wt. 70,000 lb., to Bethlehem, Penn., from York stations, Penn., Bainbridge, Penn., Billmyer, Penn, Rheems, Penn., $2 net ton, Bellefonte, Pleasant Gap, Chemical, Penn., $2.42 net ton. Reason—Same as now in effect to Conshohocken, Penn.

Southern

16676. **Mica**, dry ground, C. L., min. 60,000 lb., and **mica schist**, dry ground or screened, C. L., min. 60,000 lb. Cancel present specific commodity rates between all points in Sou. territory and establish rates from producing points to Cincinnati, O., Louisville, St. Matthews, Ky., Memphis, Tenn., Savannah, Port Wentworth, Ga., Ensley, Mobile, Ala., New Orleans, La., St. Louis, Mo., Group, on dry ground mica 27½ percent and on dry ground mica schist 25 percent of Docket 15879 scale; class rate distances to be applied.

17256. **Slabs, clay, concrete or shale**, C. L., min 50,000 lb. Establish 28c cwt., Cloverport, Ky., to Charlottesville, Va.

17291. **Limestone or marble, ground or pulverized**, C. L., min. 60,000 lb. Establish 523c net ton—Tate and Whitestone, Ga., to Mishawaka, Ind.

17294. **Lime**. Establish from Sherwood, Tenn., to Kansas City, Mo., 640c min. 30,000 lb., and 520c net ton, C. L. min. 50,000 lb., and from Burns, Tenn., 600c C. L. min. 30,000 lb., and 480c net ton C. L. min. 50,000 lb.

14381. To revise the rates on **feldspar** from Colo. points and Keystone, S. D., to the Southwest, reinstating the prior differential relationships plus the Ex Parte 123 increase. For example, where prior to Ex Parte 123 the differential Keystone over Colo. common points was uniformly 80c per ton, it is proposed to establish a uniform differential of 88c per ton the same destinations.

Western

E-41-254. **Sand, gravel** and ***stone**, crushed, C. L. (See Note 3), but in no case less than 40,000 lb. *Rate will apply only from Louisville, Neb. From Platte River zone pits, viz.: Valley, Cullom, Fremont, Louisville, Oreapolis and South Bend, Neb., to Council Bluffs, Ia. Rates: Present—61c per ton of 2000 lb. No switching charges will be absorbed at point of origin. Proposed—50c per ton of 2000 lb. No switching charges will be absorbed at point of origin.

E-41-255. **Stone**, crushed, C. L. (See Note 3), but in no case will the min. C. L. wt. be less than 60,000 lb. from Alden, Ia., to Grand Island, Neb. Rates: Present—$2.75 net ton. Proposed—$2.37 net ton.

E-203-8. **Slag**, crushed or broken, C. L. (See Note 3), but in no case shall the min. wt. be less than 40,000 lb., from Maysville, Wis., to Dubuque, Ia. Rates: Present—12c per 100 lb. per Item 2420 of W. T. L. Tariff 6-T. Proposed—$1.90 per net ton.

E-41-252. **Limestone**, agricultural or ground, C. L. (See Note 2), but in no case less than 40,000 lb., from Denver, Colo. (rates in cents per ton of 2000 lb.):

To	Present	Proposed
Ft. Morgan, Colo.	280	135
Brush, Colo.	300	143
Sterling, Colo.	360	174
Yuma, Colo.	360	180
Akron, Colo.	340	166
Wray, Colo.	380	204
Bridgeport, Neb.	440	241
Scottsbluff, Neb.	460	256
Minatare, Neb.	460	241
Mitchell, Neb.	460	256
Alliance, Neb.	460	256
Hyannis, Neb.	500	286
Benkelman, Neb.	440	241
Cambridge, Neb.	500	272
McCook, Neb.	480	256

E-43-58. **Gypsum rock**, C. L. (See Note 3), in no case shall the min. wt. be less than 50,000 lb.

To Mildred, Kan.

From	Pres.	Prop.
Blue Rapids, Kan.	8	.
Irving, Kan.	8	.
Sun City, Kan.	24	8
Medicine Lodge, Kan.	22	8

To Ft. Scott, Kan.

From	Pres.	Prop.
Blue Rapids, Kan.	20	8
Irving, Kan.	20	8
Sun City, Kan.	24	8
Medicine Lodge, Kan.	23	8

E-41-250 (Reissue). **Stone**, crushed, C. L., usual min. wt., from Sioux Falls, S. D., to Belle Plaine, Ia. Rates: Present—220c per ton of 2000 lb. Proposed—210c per ton of 2000 lb.

Illinois

8579. **Molding sand**, C. L. (See Note 3), but not less than 40,000 lb., from Buda, Ill., to Chicago, Ill.; also E. J. & E. Ry. points. Present—No specific rates. Proposed—$1.39 net ton (includes Ex Parte 123 increase).

8560-C. **Phosphate of lime**, C. L., min. wt. 40,000 lb., from St. Louis, Mo., to Cairo, Ill. Present—26c (not subject to Tariff of Increased Rates No. X-123.) Proposed—19c.

Southwestern

14273. To establish rates on agricultural **limestone, refuse lime** and wood ashes (for land fertilization purposes only), in straight or mixed C. L. (See Note 2), but not less than 80,000 lbs., from Limedale Spur, Ark., to points within 250 miles of Limedale Spur, based on the same scales as apply in Item 1530 of Missouri Pacific Tariff No. 6172-G, single line application and Item 500 of WTL Tariff No. 91-H, joint line application between points in Missouri on intrastate traffic.

New England

44807 (1-A). To cancel rates on **limestone**, ground or pulverized, etc., from Swanton, Vt., to Danby, Rutland and Vergennes, Vt., as named in Item 245C of St. J. & L. C. R. R. I. C. C. 43, and apply class rates in lieu thereof. Reason—Obsolete.

44854. **Lime**, common, hydrated, quick or slaked, min. wt. 50,000 lb., Fonda Jct., Vt., to Fostoria, Ohio. Present— 38. Proposed—$3.80 net ton. Reason—To place Fonda Jct. on a comparable basis with West Rutland, Vt.

44866 (1-R). **Crushed or broken stone**, min. wt. 70 net tons, except that where cars of lower capacity are furnished for carriers' convenience, the C. L. min. wt. will be the marked capacity of the car, Winchester, Mass., to Worcester, Mass. Present—83. Proposed—75. Reason—To enable the rail carriers to receive a haul on this material.

55387. Establish on **stone, rubble, riprap and spalls**, C. L., from Sandusky, Ohio, to Pontiac, Mich., 194c per net ton.

55391 (2). Establish on **stone**, fluxing, furnace or foundry, melting or refractory (unburned), in bulk, from Bettsville, Gibsonburg, Maple Grove, Woodville, Ohio, also from other Group 1 origins in Northern Ohio, if desired, to Port Allegheny, Penn., 242c per net ton.

55396. Establish on **crushed stone, crushed stone screenings or tailings**, in open top cars, actual wt. will apply, from Kenton, Ohio, to Charleston, W. Va., 166c per net ton.

Freight Rate Complaint

EBBE SAND AND GRAVEL CO., Waupaca, Wis., has complained to the Wisconsin Public Service Commission against freight rates on sand and gravel from a pit near Waupaca over the Green Bay and Western Railway to points on the Soo, Milwaukee and Northwestern railways. The complainant desires joint rates established to permit it to compete with pits located along the other three roads for the Fox river valley business. These pits, the Waupaca firm claims, pay only a single-line rate, while it must pay a combination rate which is considerably higher.

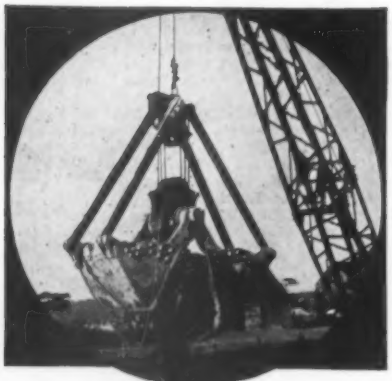
Largest Single Order for Diesel Trucks

COLONIAL SAND & STONE CO., New York, N. Y., recently placed the largest single order for Diesel-powered motor trucks on record. The order, signed by President Generoso Pope, calls for the delivery of 50 Diesel-powered Mack trucks with a total sand carrying capacity of 1,815,000 lb. This was followed up a short time later with an order for 19 additional Diesel-powered trucks of the same make.

"MINERAL RESOURCES OF GEORGIA" is the title of a useful booklet of over 100 pages issued by the State Division of Mines, Mining and Geology of Georgia. The information contained in its pages has been reduced to terminology readily understood by the average reader. Georgia has innumerable deposits of industrial minerals and others which have hardly been developed as yet.

THE SAN DIEGO, CALIF., City Council was requested recently by dealers in rock, sand and gravel to adopt an ordinance requiring weight certificates with each load delivered.

FORT SCOTT HYDRAULIC CEMENT CO., Fort Scott, Kan., has purchased two new Freuhauf trailers and two new International tractors to be used for local deliveries of cement.



Hi-power ...The Bucket for Excavating

Contractors say "It's the best bucket we've ever used" . . . because it digs deep, fills full and stands up! It will dig BIGGER PAY LOADS for you. **Ask for Bulletin 237.**

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George Haiss Mfg. Co., Inc., Park Ave. & 143rd St. New York

Who, for over 40 years, have created and sold none but equipment of demonstrable superiority in design and manufacture.

Portable Conveyors—Revolving Screens

9 YEAR OLD PLANE CROSSES ATLANTIC

Likewise—UNIVERSAL VIBRATING SCREENS built 15 to 18 years ago are still giving faithful service. However,—As New Planes provide greater safety, so the New UNIVERSAL Vibrators provide higher efficiency and lower operating costs. May we send you literature on latest models?

Write today!

UNIVERSAL VIBRATING SCREEN CO.

RACINE — WISCONSIN

THE INDUSTRY

New Incorporations

Ideal Sand and Gravel Co., Mason City, Iowa, has been incorporated by U. G. McGowan, president; Wayne A. McGowan, vice-president; and Maud B. McGowan, secretary and treasurer. The company has been organized to operate sand, gravel, stone, rock or silex deposits.

United Quarries, Inc., Winfield, Penn., is the name of a recently organized company with a capital of $200,000, which will take over the Smith Brothers quarry. Russell L. and Luther A. Smith are directors of the new enterprise along with Warren S. Reed and Lieutenant Colonel Samuel B. Wolfe of Lewisburg, and Joseph L. Ray and Dr. George A. Deitrick of Sunbury, Penn. The tremendous increase in the use of amesite in road construction, it is said, was responsible for the expansion of the company.

La Grega Sand & Gravel, Inc., Corona, N. Y., has been incorporated by Gellman & Gellman, 40 National Avenue, Corona. Capital is $10,000.

Gentry-Thomas Gravel Corp., Kokomo, Ind., has been chartered by the state, with Fred E. Thomas, John H. Gentry and Harold Little as incorporators. Charles S. Loy, Swayzee, Ind., is resident agent. Capital stock consists of 1000 shares of no par value.

National Talc Mining and Milling Co., 913 Hoge Bldg., Seattle, Wash., has been incorporated by W. E. Oldfield, Frank Mason and Herald A. O'Neill with a capital of $20,000.

The Prestonburg Sand Co., Prestonburg, Ky., with a capital of $30,000, has been granted a charter. Incorporators are H. E. Riddleberger, F. P. Grant, A. A. Riddleberger, Alton A. Riddleberger and Mary K. Riddleberger.

Columbia Marbles, Inc., Columbia, Calif., is the name of a new corporation to develop a marble quarry near Columbia. Directors are R. E. Tremoureau of the U. S. Lime Products Corporation and Charles M. Cadman, head of the Pacific Coast Aggregates Co.

Interlocking Stave Silo Co., Inc., Kans., has been incorporated in Oklahoma with a capital stock of $10,000. Una Lee Roberts, 1022 East 19th St., Oklahoma City, Okla., is service agent.

Powder Mills Asphalt, Sand and Gravel Co., Beltsville, Md., is the name of a new company. Incorporators are Robert E. Latimer and William H. McCeney, Jr.

Holden Trap Rock Co., Holden, Mass., was recently incorporated with $33,000, consisting of 300 preferred shares at $100 each, and 300 common at $10 each. Incorporators and officers include: President, Henry O. Robinson; treasurer and clerk, William A. Bourget; and C. Oliver Wellington.

Paragon Brick, Inc., Sayrville, N. Y., is the name of a recently incorporated company which has taken over Paragon Brick Co., Elizabeth, N. J. This new lime-brick company will soon establish a New York office.

Manufacturers

Gar Wood Industries, Inc., Detroit, Mich., reports that C. A. Van Dusen, the company's well known distributor in Toledo, Ohio, is dead. He was head of Van Dusen Auto Repair and Machine Co.

The American Rolling Mill Co., Middletown, Ohio, has established a district sales office in Minneapolis, Minn., with W. A. Danner in charge. Mr. Danner was formerly connected with the Chicago office. He will be assisted by S. A. Yager.

The Broderick & Bascom Rope Co., St. Louis, Mo., has announced the purchase of the business and patents of the Murray Safety Sling Co., Pittsburgh, Penn. Mr. D. Murray, manufacturer of plaited wire rope safety slings, has sold his patents to the Broderick & Bascom Rope Co., and will join the company in charge of the Murray Safety Sling Division, Pittsburgh, Penn.

Westinghouse Electric & Manufacturing Co., East Pittsburgh, Penn., has named P. Y. Danley as manager of the air conditioning department. Herbert Myatt Wilcox, manager of the new products division, died suddenly from a heart attack.

Hewitt Rubber Corp., Buffalo, N. Y., has announced the election of William S. Carleton, New York City, and Lester D. Bigelow, Chicago, as vice-presidents of the company. Joseph H. Hayden, secretary of the corporation, has been elected a member of the board of directors. Mr. Hayden has been associated with the company for 21 years and has served as secretary since 1935. Mr. Carleton has been manager of the Eastern division, with headquarters in New York since 1928, having previously been in charge of sales in New England. Mr. Carleton has served the company for 18 years. Mr. Bigelow has been manager of the Western division with headquarters in Chicago since 1933, having joined the Hewitt organization in 1932.

New officers of the Hewitt Rubber Corp. Left to right, Joseph Hayden; Lester D. Bigelow; and W. S. Carleton

Modern Wire Rope Plant of Jones and Laughlin Steel Corporation

New Wire Rope Company

Jones & Laughlin Steel Corp., Chicago, Ill., has entered into the wire rope market, with a new modern plant. This new plant, to be known as the Gilmore Wire Rope Division of the Jones and Laughlin Steel Corp., will be headed by Robert Gilmore, a leader in the wire rope industry, as general manager of this division. Mr. Gilmore has devoted his entire business life to the development and manufacture of wire rope.

Robert Gilmore

This new modern plant is indicative of an expansion and development program carried on by Jones and Laughlin under the direction of President H. E. Lewis who states: "The entrance of Jones and Laughlin into the manufacture of wire rope enlarges considerably our opportunity for satisfactory return on raw materials and for better operations of our rod and wire mills.

"The plant at Muncy, Penn., is new in all respects and incorporates features for the manufacture of products having superior qualities that will assure our immediate participation in all major markets for wire rope."

Iron & Steel Products, Inc., Hegewisch, Ill., has announced the resignation of E. W. Provost.

Worthington Pump and Machinery Corp., Harrison, N. J., has announced the appointment of Ludwig Emde to the position of Detroit district sales manager, succeeding William J. Daly, recently transferred to the company's Philadelphia office as manager. Henry Laidlaw of Detroit, Mich., and widely known in the pumping machinery field, died recently.

John A. Roebling's Sons Co., Trenton, N. J., has established a branch office and warehouse at 955 North avenue, West, Pittsburgh, Penn.

Farrel-Birmingham Co., Inc., has announced the transfer of Edward S. Coe, Jr., from its Buffalo plant to its branch sales office located at 1059 First National Bank Bldg., Chicago, Ill., to promote the sale of herringbone gears and gear units.

Oliver United Filters, Inc., has appointed C. W. Crumb as central division sales manager with headquarters at 221 N. La Salle St., Chicago, Ill.

Link-Belt Co., Chicago, Ill., has appointed William W. Bond as western sales manager of the positive drive division, with headquarters at the Dodge plant in Indianapolis, succeeding the late G. Howard Burkholder. Ralph S. Dyson, for many years manager of stock silent and roller chain drives through distributors, will also head up roller chain sales to duplicate machinery manufacturers.

Nordberg Manufacturing Co., Milwaukee, Wis., has reported that arrangements have been made with La Consolidada, S. A., Calzada de la Ronda, Apartado 81, Bis, Mexico, D. F., for the sale and service in Mexico of Symons cone crushers, screens, and the complete line of Nordberg power tools for the maintenance of railroad track. For several years, La Consolidada has been supplying crushing members for Symons cone crushers.

Ransome Concrete Machinery Co., Dunellen, N. J., has appointed Earl Ives Equipment Co., 1419 Mentor Ave., Mentor, Ohio, as exclusive representatives for the sale of truck mixers and agitators.

Worthington Pump and Machinery Corp., Harrison, N. J., announces that William J. Daly, formerly Detroit district sales manager, has been transferred to the Philadelphia office to succeed the late C. H. Shaw. Mr. Daly will be assisted by W. J. Van Vleck, recently appointed assistant manager in the Philadelphia district.

Bucyrus-Erie Co., South Milwaukee, Wis., has appointed Reynolds and Son, Inc., Barre, Vt., as distributor for the entire state of Vermont, and Grafton and Sullivan counties in New Hampshire. Reynolds and Son, Inc. will work in cooperation with the New York and Boston offices of Bucyrus-Erie. Announcement also has been made that the Clapp Machinery Co., Groton, N. Y., will be distributor for county and township sales in the central portion of New York.

The Lewis-Shepard Sales Corp., Watertown, Mass., has made the following new appointments of representatives to handle its line of lift trucks, portable elevators, and other material handling equipment: Wesley D. Low, P. O. Box 1124, Knoxville, Tenn., for Nashville and Knoxville, Tenn.; Industrial Supply Co., Salt Lake City, Utah, for Utah and neighboring states; and J. W. Ralston Co., Seattle, Wash., for the state of Washington.

Allied Tractor Equipment Co., Findlay, Ohio, is the name of a new corporation. Richard A. Wheeler, former sales manager of Emsco Derrick and Equipment Co., Los Angeles, Calif., and Howard K. Biggs, also at one time connected with the company, will be identified with the new organization. The new company will be the exclusive sales agents for the Tractor Equipment Division of Emsco. In addition to the Emsco line, the new organization will handle the sales in certain territories for Buckeye Traction Ditcher Co., Findlay, Ohio.

The Macwhyte Co., Kenosha, Wis., was host to the Wisconsin State Association of Power Engineers in a trip through the plant where the various steps in the manufacture of wire rope were shown. The trip was arranged during the convention held in Kenosha, June 17 and 18.

Cement Mill Equipment Co., formerly located in Detroit, Mich., has moved to new and larger quarters in Plymouth, Mich.

Cuts Hauling & Dumping Costs

The Brooks LOAD LUGGER

PATENTED — PATENTS PENDING

Don't overlook the cost-cutting possibilities of the Brooks Load-Lugger. It's the most practical, fool-proof, and greatest cost-cutting method known, for hauling and dumping any material where loading is done by hand. One truck with a "litter" of bodies . . . is the Load-Lugger way. Made in four capacities, shipped assembled, ready for installation on any truck chassis in a few hours.

ONE MAN OPERATED from driver's seat. No sheaves, cables, or "gadgets" to worry with. Buckets rest directly on chassis, no suspended load. Its speed and performance is almost unbelievable. For complete details and prices write the manufacturers. Demonstrations arranged in most sections.

BROOKS EQUIPMENT & MFG., CO.

48 DAVENPORT ROAD,
KNOXVILLE, TENN.

PERFORATED METAL
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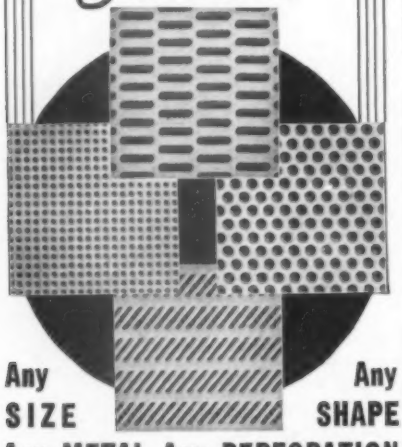

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Any METAL Any PERFORATION

H & K's many years of screening perforation experience is your assurance of dependable screening accuracy and lasting, efficient performance. Grant us an opportunity to quote on your requirements.

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A New High Degree of Crushing Efficiency

More production—more profit—lower operating and maintenance costs. All these are features of DIXIE performance.

Simple in design, yet sturdy in construction, DIXIE NON-CLOG and Regular Stationary Breakers are unexcelled for primary, secondary or fine reduction. Note particularly the continually moving breaker plate which means that DIXIE Hammermills will outlast and out-perform any other type.

Write for complete details on DIXIE'S 40 sizes.

DIXIE MACHINERY MFG. CO.
4109 Goodfellow Ave. ST. LOUIS, MO.

Allis-Chalmers Manufacturing Co., Milwaukee, Wis., has moved its Boston, Mass., office to the Park Square Building, 31 St. James Avenue. W. F. Taylor continues as manager of the office.

General Refractories Co., Philadelphia, Penn., announces the following distributor appointments: Slip Not Belting Co., Kingsport, Tenn.; Fleck Co., Camden, N. J.; New England Brick Co., Boston, Mass.; Lusco Brick & Stone Co., Kansas City, Kans.

Johns-Manville Corp., New York, N. Y., has elected Dr. Walter A. Jessup to the Board of Directors to advise the company on social responsibility. Dr. Jessup is president of the Carnegie Foundation for the advancement of Teaching.

The Hill Clutch Machine & Foundry Co., formerly located at 44 Main St., Orange, N. J., has reestablished their New York address at 90 West Street. This office will operate as the eastern branch for power transmission and agitator sales and Arthur L. Whitside will be in charge.

Westinghouse Electric & Manufacturing Co., East Pittsburgh, Penn., has announced the creation of an agency sales department. F. R. Kohnstamm has been appointed manager of the new department, with headquarters in Cleveland, Ohio. Charles V. Allen, treasurer of the Westinghouse International Co., since 1925, has retired after 45 years' continuous service with Westinghouse.

Connecticut Blower Co., Hartford, Conn., has announced through Charles H. Keeney, general manager, the appointment of two additional sales engineers. Julius Lamparzyk, Cleveland, Ohio, will represent the company in Ohio, and Arthur Polston, Louisville, Ky., the state of Kentucky.

The Buda Co., Harvey, Ill., has announced that at the July meeting of the Board of Directors L. M. Viles, president for over 20 years, was elected to the position of chairman of the board. J. S. Dempsey, secretary, treasurer and vice-president for many years was elected president. F. E. Place, who has been associated with the company since 1908, has retired as senior vice-president.

The James F. Lincoln Arc Welding Foundation has announced that papers submitted in the $200,000 award program are being judged at Cornell University, Ithaca, N. Y., by the Foundation Jury of Award, consisting of 30 jurors from engineering departments of various colleges and universities.

Automatic Machinery Manufacturing Corp., Bridgeport, Conn., is the name of the new company which has taken over the business and assets of the Automatic Machine Co., Bridgeport, Conn., through a 77-B reorganization. Geo. L. Sexton will continue as president and manager of the company. The company manufactures diamond boring machines, automatic threading lathes, open side shaper-planers, etc.

Liquid Control.—S. F. Bowser & Co., Inc., Fort Wayne, Ind. Folder describes lubrication systems and various liquid control equipment manufactured by this company.

Tiering Trucks.—The Elwell-Parker Electric Co., Cleveland, Ohio. Type E-2 high-lift platform trucks and Type F-8 tiering fork trucks are described in two bulletins. These units are illustrated to show their use in stacking bags, such as cement, and cast stone.

Multi-Vent Concrete Units.—F. H. Hedinger, 303 Lexington Ave., New York, N. Y. Bulletins have been distributed by Mr. Hedinger, the United States representative of the Multi-Vent system of making concrete masonry units. These units are essentially interlocking concrete brick that lay up in the wall similar in appearance to clay brick, but each unit has cast into it a hollow vent space.

Vitrotex.—Anaconda Wire and Cable Co., New York, N. Y. This new bulletin describes a new textile made of glass which is used in making Vitrotex magnet wire and coils, the outstanding characteristic of which is the ability to withstand high temperatures for long periods of time.

Trade Literature

The following literature, recently published, is available free, upon request to the respective sponsor:

Dust Collection.—Buell Engineering Co., Inc., 70 Pine St., New York, N. Y. An attractive eight-page pamphlet has been prepared which describes the Van Tongeren system of dust collection employed in the Buell dust collector. Illustrations show the two models, AC 130 and AC 150, and a drawing shows details of the dust collector. Various applications of this system are described.

Refractory Walls.—Geo. P. Reintjes Co., Kansas City, Mo. Bulletin No. 301, 16 pages, describes refractory walls and arches in boilers and furnaces and is profusely illustrated to show the various types of construction.

Testing Equipment.—Humboldt Mfg. Co., Chicago, Ill. Supplementary catalog No. 9-C, 32 pages, lists a complete line of laboratory and testing equipment for testing cement, concrete, and aggregates.

Roller Chains and Sprockets.—Link-Belt Co., Chicago, Ill. This is a book of 174 pages of practical information, application illustrations, and engineering data on roller chains and sprockets for drives and conveyor uses. Data book No. 1757, as it is called, gives notes, formulae and tabular data on how to select the proper combination of chain and wheels for an efficient drive.

Core Drill Bit.—The Sullivan Machinery Co., Michigan City, Mich. Descriptive literature covers the core drilling bit known as Koebelite Korbit which consists essentially of a number of bortz-bearing inserts brazed into radial slots in the face of the bit blank.

Refractories.—General Refractories Co., Philadelphia, Penn. "How to Reduce Spalling With Super Duty Refractories" is the title of a 12-page booklet recently announced. It is printed in two colors and gives charts, tests and general information on three types of refractories, Hiac, Superac and Airam.

Motors, Gear.—General Electric Co., Schenectady, N. Y. Bulletin GEA-1437C describes and illustrates various applications of gear-motors in polyphase, single-phase or d-c types. These units have the helical gear planetary type of transmission to operate machinery at low speeds.

Magnetic Separators.—Dings Magnetic Separator Co., Milwaukee, Wis. Catalog No. 770 deals primarily with the super high-intensity type IR induction magnetic separators and the type E (Rowand-Wetherill) cross belt machines. Other types of machines also are illustrated.

Electric Equipment, Reconditioning Flooded.—General Electric Co., Schenectady, N. Y. A 16-page booklet, GEA-2571B, has been compiled with detailed instructions as to the proper procedure which should be followed in reconditioning electric equipment. This booklet should be of value to every plant in the rock products industry as most producers are confronted with flood problems at some time during the year.

Fence, Chain Link.—Wickwire Spencer Steel Co., New York, N. Y. Over 60 actual photographs of fence for every type of industrial, residential and other services are shown in the 50-page booklet which has been printed in two colors. There are in addition, numerous diagrams, charts and drawings showing construction and specification details.

Stabilized Roads.—The Calcium Chloride Association, Detroit, Mich. In the Spring, 1938 edition of Calcium Chloride Association News are a number of articles describing methods of controlling dust and stabilizing roads through applications of calcium chloride.

"BEST SUCTION HOSE I EVER USED"

THAT'S how the superintendent of a large South Carolina sand and gravel company describes the many lengths of Goodyear Style M Sand Suction Hose, with cast iron flanged nipples built integral, being used throughout his plant.

And with good reason. Before changing to Style M Hose on recommendation of the G.T.M.—Goodyear Technical Man—200,000 to 250,000 yards of gravel was the maximum service from any hose used.

Now, with Goodyear Style M they are averaging from 400,000 to 500,000 yards—double the yardage of previous brands—with a service life of from three to five years depending upon the amount of gravel run.

This is typical of the money-saving service you get from all Goodyear Mechanical Rubber Goods—transmission and conveyor belting; air, water and suction hose—specified by the G.T.M. Why don't you put your tough problems up to this friendly adviser? To bring him to your plant, just write Goodyear, Akron, Ohio, or Los Angeles, California—or call the nearest Goodyear Mechanical Rubber Goods Distributor.

GTM-Specified
GOODYEAR STYLE M SAND SUCTION HOSE (smooth bore)
for heavy duty service
A
B
C
D
A — Extra heavy tube specially compounded to resist cutting action of sand
B — Rubber-impregnated duck "anchor" strip prevents tube from being drawn out by suction.
C — Heavy wire spiral keeps hose from collapsing under suction
D — Multi-ply carcass of heavy duck with abrasion-resisting rubber cover.
Made in all sizes — lengths up to 30 feet
BELTS
MOLDED GOODS
HOSE
PACKING
Made by the makers of Goodyear Tires

THE GREATEST NAME IN RUBBER

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Classified Directory of Advertisers in this Issue of ROCK PRODUCTS

For alphabetical index, see page 102

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American Cable Co.
American Steel & Wire Co.
Leschen, A., & Sons Rope Co.
Macwhyte Co.

Aggregates (Special)
Mica Crystal Co.
Victor Chemical Wks.

Agitators
Allis-Chalmers Mfg. Co.
Hetherington & Berner, Inc.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

Air Compressors
Allis-Chalmers Mfg. Co.
Fuller Co.
Nordberg Mfg. Co.
Quincy Compressor Co.
F. L. Smidth & Co.
Traylor Engineering & Mfg. Co.

Air Filters
Blaw-Knox Co.
Dracco Corp.
Federal Pneumatic Systems, Inc.
Fuller Co.

Air Separators
Blaw-Knox Co.
Combustion Engr. Corp.
Federal Pneumatic Systems, Inc.
Link-Belt Co.
Raymond Pulv. Div.
Smidth, F. L., & Co.
Sturtevant Mill Co.
Williams Patent Crusher & Pulv. Co.

Airveyors
Fuller Co.

Ash & Refuse Handling Equipt.
Allen-Sherman Hoff Co.
Haiss, Geo., Mfg. Co.
Hetherinton & Berner, Inc.
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Robins Conveying Belt Co.

Asphalt Mixer Regulators
Hetherington & Berner, Inc.

Asphalt Mixing Plants
Hetherington & Berner, Inc.
Traylor Engineering & Mfg. Co.
White Mfg. Co.

Axles
Eagle Iron Works

Babbitt Metal
Allis-Chalmers Mfg. Co.
Dixie Machy. Mfg. Co.
Ryerson, Jos. T., & Son, Inc.

Backdiggers
Link-Belt Co.

Backfillers
Austin-Western Road Machy. Co.
Bucyrus-Erie Co.
Link-Belt Co.
Thew Shovel Co.

Bag Cleaning Machines
Link-Belt Co.

Bag Ties
American Steel & Wire Co. (U. S. Steel Corp. Subsid.)
Wickwire-Spencer Steel Co.

Bagging Machines
Smidth, F. L., & Co.

Baiers or Bundling Machines (Sack)
Besser Mfg. Co.

Balls (Grinding)
Allis-Chalmers Mfg. Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsi.)
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

Barges
Chicago Bridge & Iron Co.
Eagle Iron Works

Batchers, Measuring Volume
Besser Mfg. Co.
Fuller Company
Jaeger Machine Co.

Batteries
Goodyear Tire & Rubber Co., Inc.

Bearing Metals
Allis-Chalmers Mfg. Co.

Bearings (Anti-Friction)
Eagle Iron Works
Hetherington & Berner, Inc.
Link-Belt Co.
Robins Conveying Belt Co.
Ryerson, Jos. T., & Sons, Inc.
SKF Industries, Inc.
Standard Pressed Steel Co.
Timken Roller Bearing Co.

Bearings (Ball)
SKF Industries, Inc.

Bearings (Roller and Tapered Roller)
SKF Industries, Inc.
Timken Roller Bearing Co.

Bearings (Thrust)
SKF Industries, Inc.
Timken Roller Bearing Co.

Belting (Elevator and Conveyor)
Austin-Western Road Machy. Co.
Bacon, Earle C., Co.
Barber-Greene Co.
Goodyear Tire & Rubber Co., Inc.
Haiss, Geo., Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Thermoid Rubber Co.

Belting (Metal)
Wickwire-Spencer Steel Co.

Belting (Transmission)
Bacon, Earle C., Co.
Goodyear Tire & Rubber Co., Inc.
Haiss, Geo., Mfg. Co.
Link-Belt Co.
Smidth, F. L., & Co.
Thermoid Rubber Co.

Belting (V Type)
Allis-Chalmers Mfg. Co.
Goodyear Tire & Rubber Co., Inc.
Link-Belt Co.
Rockwood Mfg. Co.
Thermoid Rubber Co.

Belting (Wire)
Wickwire-Spencer Steel Co.
Bristol Co.

Belt Fasteners or Hooks
Flexible Steel Lacing Co.
Robins Conveying Belt Co.

Belt Idlers
Link Belt Co.
Robins Conveying Belt Co.
Smith Engineering Wks.

Belt Lacing
Bristol Co.
Flexible Steel Lacing Co.

Belt Tighteners
Robins Conveying Belt Co.

Belt Trippers
Bacon, Earle Co., Inc.
Link-Belt Co.
Robins Conveying Belt Co.

Bin Gates
Allen-Sherman-Hoff Co.
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Co.
Besser Mfg. Co.
Fuller Co.
Geo. Haiss Mfg. Co., Inc.
Hendrick Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt Co.
Smith Engineering Works
Traylor Engineering & Mfg. Co.

Bin Indicators
Fuller Co.

Bins (Storage)
Allen-Sherman-Hoff Co.
Austin-Western Road Machy. Co.
Besser Mfg. Co.
Blaw-Knox Co.
Chicago Bridge & Iron Co. (Hopper & Steel Storage)
Eagle Iron Works
Hendrick Mfg. Co.
Hetherington & Berner, Inc.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

Blasting Caps
Du Pont, E.I., de Nemours & Co., Inc.

Blasting Cap Crimpers
Du Pont, E.I., de Nemours & Co., Inc.
Ensign-Bickford Co.

Blasting Machines
Du Pont, E.I., de Nemours & Co., Inc.

Blasting Supplies
Du Pont, E.I., de Nemours & Co., Inc.
Ensign-Bickford Co.

Block Machines, Building
Anchor Concrete Machinery Co.
Besser Mfg. Co.
Multiplex Concrete Machy Co.
R & L Concrete Machy. Co.

Blocks (Pillow)
Allis-Chalmers Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
SKF Industries, Inc.
Standard Pressed Steel Co.
Timken Roller Bearing Co.

Blocks (Sheave)
Haiss, Geo., Mfg. Co.
Link-Belt Co.
Pioneer Engineering Wks., Inc.
Sauerman Bros.

Blowers
Allis-Chalmers Mfg. Co.
Ideal Commutator Dresser Co.
Roots - Connersville Blower Corp.

Boats
Chicago Bridge & Iron Co.

Blue Printing Machy.
The C. F. Pease Co.

Boats (Self-Unloading)
Link-Belt Co.
Robins Conveying Belt Co.

Boilers
Combustion Engineering Corp.

Bolts
Standard Pressed Steel Co.

Bond Wire
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)

Brick Machines
Besser Mfg. Co.
Jackson & Church Co.
Multiplex Concrete Mach. Co.
R & L Concrete Machinery Co.

Buckets (Aerial Tramways)
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)

Buckets (Clamshell, Grab, Orange Peel, etc.)
Blaw-Knox Co.
Bucyrus-Erie Co.
Kiesler, Jos. F., Co.
Geo. Haiss Mfg. Co., Inc.
Hayward Company
Jaeger Machine Co.
Link-Belt Co.
Robins Conveying Belt Co.

Buckets (Dragline and Slackline)
American Manganese Steel Co.
Austin-Western Road Machy. Co.
Besser Mfg. Co.
Blaw-Knox Co.
Bucyrus-Erie Co.
Hayward Company
Hendrick Mfg. Co.
Link-Belt Co.
Pioneer Engineering Wks., Inc.
Sauerman Bros., Inc.

Buckets (Dredge & Excavator)
Bucyrus-Erie Co.
Haiss, Geo., Mfg. Co.
Hayward Co.

Buckets (Elevator and Conveyor)
Bacon, Earle C., Co.
Haiss, Geo., Mfg. Co.
Hendrick Mfg. Co.
Jaeger Machine Co.
Lewistown Foundry & Mach. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Smith Engr. Wks.

Buckets (Electric Heated, Weighing)
Easton Car & Const. Co.

Building Tile Machines
Besser Mfg. Co.
Multiplex Concrete Machy. Co.
R & L Concrete Machy. Co.

Bulldozers
Baker Mfg. Co.
Blaw-Knox Co.
Bucyrus-Erie Co.
Koehring Co.

Bullscrapers
Bucyrus-Erie Co.

Bushings
Eagle Iron Wks.
Link-Belt Co.

Cableways
American Cable Co. Inc.
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Blaw-Knox Co.
Leschen, A., & Sons Rope Co.
Link-Belt Co.
Macwhyte Co.
Sauerman Bros.
Wickwire-Spencer Steel Co.

Calcining Equipment
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

Capstans
Link-Belt Co.
Robins Conveying Belt Co.

Cars (Block, Dump, Industrial, Etc.)
Austin-Western Road Machy. Co.
Besser Mfg. Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsi.)
Eagle Iron Works
Easton Car & Construction Co.
Link-Belt Co.
Multiplex Concrete Mach. Co.
Traylor Engineering & Mfg. Co.

Car Couplings and Hitches
Macwhyte Co.

Car Dumps
Eagle Iron Wks.
Link-Belt Co.

"THERE'S A REAL *Quality Story* BEHIND THESE GULF OILS!"

Here is one of the machines Gulf's technical men have devised for testing lubricating oils. The oil, mixed with water, is circulated rapidly through the machine while a stream of oxygen is whipped thoroughly into it. Many oils have been tested with this instrument but none have shown stability equal to Gulf's higher quality oils.

GOOD CRUDES, refined by modern methods, make fine lubricating oils—oils that prove their quality in industry's machines. Performance in actual service is the real test of any product, including oils and greases.

Yet Gulf research engineers have not been content with the usual service tests for Gulf's higher quality lubricants. They have devised laboratory instruments which punish oils far more severely than any machine in industry . . . instruments that find ways to make oils oxidize and break down. As a result of these tests, Gulf engineers then develop oils with such characteristics that they can stand far greater punishment than they will ever receive in normal service. Thus users are assured of oils that possess a "margin of safety" well beyond average requirements.

There's a real quality story behind Gulf oils and greases. Let a Gulf engineer demonstrate to you—on the job—how Gulf's higher quality lubricants provide a greater measure of protection for your equipment—and help you reduce maintenance and repair expense.

GULF INDUSTRIAL LUBRICATION

GULF OIL CORP. • GULF REFINING CO.

GENERAL OFFICES, PITTSBURGH, PA.

Classified Directory—*Continued*

Car Pullers & Movers
Link-Belt Co.
Robins Conveying Belt Co.

Car Wheels
Eagle Iron Wks.
Link-Belt Co.

Castings
Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Bacon, Earle C., Co.
Blaw-Knox Co.
Dixie Machinery Mfg. Co.
Eagle Iron Works (Grey Iron)
Hetherington & Berner, Inc.
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt Co.
Smidth, F. L., & Co.
Timken Roller Bearing Co
Traylor Engineering & Mfg. Co.

Cement Plants (Contractor)
Allis-Chalmers Mfg. Co.
F. L. Smidth & Co.
Traylor Engineering & Mfg. Co.

Cement Colors
Mepham, Geo. S., Corp.

Cement Process
Cement Process Corp.

Cement Pumps
Fuller Co.
Smidth, F. L., & Co.

Central Mixing Plants (Concrete)
Blaw Knox Co.
Jaeger Machine Co.

Chain (Dredge and Steam Shovel)
American Manganese Steel Co.
Bucyrus-Erie Co.
Link-Belt Co.

Chain (Elevating and Conveying)
Bacon, Earle C., Co.
Haiss, Geo., Mfg. Co.
Link-Belt Co.

Chimney Block Machines and Molds
Besser Mfg. Co.

Chutes (Bin, Truck, Concrete, Etc.)
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Earl C. Bacon, Inc.
Blaw-Knox Co.
Chicago Bridge & Iron Co.
Eagle Iron Works
Haiss, Geo., Mfg. Co.
Hendrick Mfg. Co.
Jaeger Machine Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Ross Screen & Feeder Co.
Smidth, F. L., & Co.
Traylor Engineering & Mfg Co.

Chute Liners
Bacon, Earle C., Inc.
Haiss, Geo., Mfg. Co.
Hendrick Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt Co.
Smidth, F. L., & Co.

Circuit Breakers
Allis-Chalmers Mfg. Co.

Clarifiers
Link-Belt Co.

Classifiers
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Deister Concentrator Co.
Eagle Iron Works
Lewistown Fdry. & Mach. Co.
Link-Belt Co.
Nordberg Manufacturing Co.
Pioneer Engineering Wks., Inc.
Raymond Pulverizer Division
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.
Universal Vibr. Screen Co.
Williams Patent Crusher & Pulv. Co.

Clutches
Allis-Chalmers Mfg. Co.
Link-Belt Co.

Coal Pulverizing Equipment
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Combustion Engr. Corp.
Link-Belt Co.
Pennsylvania Crusher Co.
Raymond Pulverizer Division
F. L. Smidth & Co.
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Concrete Mixers
Anchor Concrete Machy. Co.
Besser Mfg. Co.
Blaw-Knox Co.
Jaeger Machine Co.
Koehring Co.
Multiplex Concrete Machy. Co.

Controllers (Electric)
Allis-Chalmers Mfg. Co.

Converters (Electric)
Allis-Chalmers Mfg. Co.

Conveyors (Apron)
Allis-Chalmers Mfg. Co.
Barber-Greene Co.
Link-Belt Co.
Robins Conveying Belt Co.
Traylor Engr. & Mfg. Co.
Wickwire-Spencer Steel Co.

Conveyors (Belt)
Allen-Sherman-Hoff Co.
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Earle C. Bacon
Barber-Greene Co.
Besser Mfg. Co.
Dracco Corp.
Fuller Company
Geo. Haiss Mfg. Co., Inc.
Hendrick Mfg. Co.
Lewistown Fdy. & Mach. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Multiplex Concrete Mach. Co.
New Holland Machine Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
F. L. Smidth & Co.
Smith Engineering Works
Sturtevant Mill Co.
Traylor Engineering & Mfg. Co.
Wickwire-Spencer Steel Co.
Williams Patent Crusher & Pulv. Co.

Conveyors (Hydro Vacuum)
Allen-Sherman Hoff Co.

Conveyors (Pan)
Allis-Chalmers Mfg. Co.
Link-Belt Co.

Conveyors (Pneumatic)
Dracco Corp.
Federal Pneumatic Systems, Inc.
Fuller Company
Raymond Pulverizer Division

Conveyors (Screw)
Besser Mfg. Co.
Eagle Iron Works
Link-Belt Co.

Conveyors (Trolley)
Link-Belt Co.

Conveyors (Vibrating)
Allis-Chalmers Mfg. Co.
Link-Belt Co.
Smidth, F. L., & Co.

Conveyor Idlers & Rolls
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Barber-Greene Co.
Haiss, Geo., Mfg. Co.
Link-Belt Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Smidth, F. L., & Co.

Coolers
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Chicago Bridge & Iron Wks. Co.
Link-Belt Co.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

Coolers (Clinker)
Fuller Co.

Correcting Basins
F. L. Smidth & Co.

Couplings (Flexible and Shaft)
Allis-Chalmers Mfg. Co.
Link-Belt Co.
Lovejoy Flexible Coupling Co.
Robins Conveying Belt Co.
Standard Pressed Steel Co.

Cranes (Diesel Electric Steam, Etc.)
Austin-Western Road Machy. Co.
Bucyrus-Erie Co.
Koehring Co.
Link-Belt Co.
Thew Shovel Co.

Cranes (Tractor)
Austin-Western Road Machy. Co.
Bucyrus-Erie Co.
Koehring Co.
Link-Belt Co.

Cranes (Truck)
Thew Shovel Co.

Crawler Attachments
Allis-Chalmers Mfg. Co.
Link-Belt Co.

Crawling Tractor Excavators
Austin-Western Road Machy. Co.
Koehring Co.
Link-Belt Co.
Thew Shovel Co.

Crusher Parts
Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
American Pulverizer Co.
Bacon, Earle C., Co.
Dixie Machinery Mfg. Co.
Eagle Iron Works
Electric Wheel Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Engineering Wks., Inc.
Taylor Forge & Pipe Wks.
Traylor Engr. & Mfg. Co.

Crushers (Hammer)
Allis-Chalmers Mfg. Co.
American Pulv. Co.
Austin-Western Road Machy. Co.
Brooks Equipment & Mfg. Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsi.)
Dixie Machy. Mfg. Co.
Sturtevant Mill Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Jaw and Gyratory)
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Earle C. Bacon, Inc.
Dixie Machinery Mfg. Co.
Lewistown Fdy. & Mach. Co. (Jaw)
McLanahan & Stone Corp.
New Holland Machine Co.
Nordberg Mfg. Co.
Pennsylvania Crusher Co.
Pioneer Engineering Wks., Inc.
Smith Engineering Works
Traylor Engineering & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Laboratory)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Bacon, Earle C., Co.
Dixie Machinery Mfg. Co.
Pennsylvania Crusher Co.
Sturtevant Mill Co.
Traylor Engineering & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Primary Breakers)
Allis-Chalmers Mfg. Co.
Smith Engr. Wks.
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Reduction)
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Smith Engr. Wks.
Traylor Engr. & Mfg. Co.

Crushers (Ring)
American Pulverizer Co.
Dixie Machinery Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Roll)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Co.
Besser Mfg. Co.
Brooks Equipment & Mfg. Co.
Eagle Iron Works
Link-Belt Co.
McLanahan & Stone Corp.
New Holland Machine Co.
Pennsylvania Crusher Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Smith Engineering Works
Sturtevant Mill o.
Traylor Engineering & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Crushing and Screening Plants (Portable)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Co.
Barber-Greene Co.
Blaw-Knox Co.
Dixie Machinery Mfg. Co.
Eagle Iron Works
Link-Belt Co.
Pennsylvania Crusher Co.
Pioneer Engineering Wks., Inc.
Smith Engineering Works
Traylor Engineering & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Curing Racks
Besser Mfg. Co.
Multiplex Concrete Machy. Co.

Dedusters
Blaw-Knox Co.

Dehydrators
Pioneer Engineering Wks., Inc.

Derricks
Hayward Company

Detonators
Du Pont, E.I., de Nemours & Co.
Ensign-Bickford Co.

Dewatering Machines
Allis-Chalmers Mfg. Co.
Eagle Iron Wks.
Jaeger Machine Co.
Link-Belt Co.
Morris Machine Works
Schneible, Claude B., Co.

Diaphragms (Rubber)
Jaeger Machine Co.

Dippers & Teeth (Dredge & Shovel
American Manganese Steel Co.
Bucyrus-Erie Co.
Koehring Co.
Link-Belt Co.
Link-Track Engr. Co.
Thew Shovel Co.

Disentegrators
Smidth, F. L., & Co.

Ditchers
Barber-Greene Co.
Bucyrus-Erie Co.

. . . chortled the Sales Mgr. to the Adv. Mgr.

"Don't faint, Al. I know it sounds strange for my men to say they want more advertising. But they do. Not a bigger total budget, but a bigger chunk of our advertising dollar used to help 'em get our story to the rock products and concrete products field . . . more ads in ROCK PRODUCTS.

"You and I have had plenty of battles. But today, when the management is after me to get more sales at less cost, I'm going to need all the help that advertising can give my men.

"You've told me how ROCK PRODUCTS covers the market we have to sell . . . how it does a swell editorial job—and how we know it is read because its readers pay subscription cash for it. Those readers are my gang's prospects and since it costs less than the price of a cheap cigar per prospect to reach them, let's "hype up" our schedule in ROCK PRODUCTS. Let's cultivate the men that my men have to sell."

"All I can say," muttered Ad. Manager Al, "is that the old order changeth when a hard-boiled sales manager like you learns to appreciate the media worth of a strong business paper like ROCK PRODUCTS.

Highest editorial standards and publishing integrity.

ROCK PRODUCTS

bears the twin hall-marks of known value

Proved reader interest in terms of paid circulation.

PRODUCE HIGH EARLY STRENGTH

Normal, all-purpose, masonry, plastering and stuccoing cements under the several BLANK patented processes.

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Inquiries invited from producers of cement, lime and allied products.

Patents issued and pending in the United States, Canada, and in Leading Central and South American and European Countries.

Investigations and experimental tests carried out at plants of interested producers by technical experts familiar with processes at no cost to producer.

Our booklet No. 1 will be sent interested parties on request.

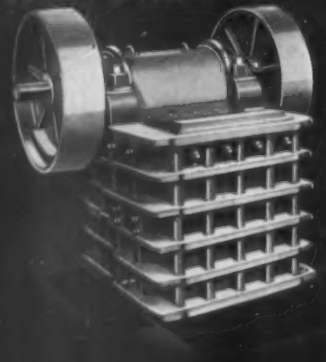
CEMENT PROCESS CORP.

John A. Blank, Chemical Engr.,
Cement & Lime Plants Division,
710 So. 6th St., Ironton, Ohio

MAIN OFFICE
90 Broad Street
New York

MEXICAN BRANCH
P.O. Box 515, Mexico City, Mexico

HERE'S HOW—



24 x 36
JAW
CRUSHER

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Jaws
48" Deep

You can crush 20" rock with a Primary Breaker

—That is light to move—
(only 15 tons)

—That has brute strength—steel castings and SKF Bearings.

—That will reduce down to 3" or 4".

PIONEER

PIONEER ENGINEERING WORKS
• MINNEAPOLIS, MINNESOTA •

Classified Directory—*Continued*

Dragline Cableway Excavators
American Cable Co.
Austin-Western Road Machy. Co.
Blaw-Knox Co.
Bucyrus-Erie Co.
Koehring Co.
Link-Belt Co.
Sauerman Bros., Inc.
Thew Shovel Co.
Wickwire-Spencer Steel Co.

Dredges
Bucyrus-Erie Co.
Eagle Iron Works
Hayward Co.
Hetherington & Berner, Inc. (Complete Steel)
Link-Belt Co.
Morris Machine Works

Dredge Cutter Heads & Ladders
Eagle Iron Wks.
Hetherington & Berner, Inc.

Dredge Hulls
Chicago Bridge & Iron Co.
Eagle Iron Wks.

Dredging Sleeves
Hetherington & Berner, Inc.
Thermoid Rubber Co.

Drills (Blast Hole)
Bucyrus-Erie Co.

Drills (Rock)
Bucyrus-Erie Co.
Timken Roller Bearing Co.

Drills, Wagon
Electric Wheel Co.

Drills (Well)
Bucyrus-Erie Co.

Drill Bits
Bucyrus-Erie Co.
Timken Roller Bearing Co.

Drill Sharpening Machines
Bucyrus-Erie Co.

Drilling Accessories
Bucyrus-Erie Co.
Timken Roller Bearing Co.

Drives (Belt, Chain and Rope)
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Co.
Link-Belt Co.
Smidth, F. L., & Co.

Drives (Short Center)
Allis-Chalmers Mfg. Co.
Earle C. Bacon, Inc.
Link-Belt Co.
Smidth, F. L., & Co.

Drives (Worm)
Link-Belt Co.

Dryers
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Chicago Bridge & Iron Co.
Combustion Engineering Corp.
Hetherington & Berner, Inc.
Lewistown Foundry & Mach. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Raymond Pulverizer Division
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.
Tyler, W. S., Co.
White Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Dust Collecting Systems
Allen-Sherman-Hoff Co.
Allis-Chalmers Mfg. Co.
Blaw Knox Co.
Chicago Bridge & Iron Co.
Dracco Corp.
Federal Pneumatic Systems, Inc.
Raymond Pulverizer Division
Schneible, Claude B., Co.
Smidth, F. L., & Co.

Dust Conveying Systems
Allen-Sherman-Hoff Co.
Blaw-Knox Co.
Dracco Corp.
Fuller Company

Dust Collector Bags
Blaw-Knox Co.

Dynamite
Du Pont Co.

Electric Motors
Allis-Chalmers Mfg. Co.

Electric Motor Starters
Allis-Chalmers Mfg. Co.

Elevators
Allen-Sherman-Hoff Co.
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Co.
Barber-Greene Co.
Besser Mfg. Co.
Dracco Corp.
Eagle Iron Works
Fuller Company
Haiss, Geo., Mfg. Co.
Hendrick Mfg. Co.
Jaeger Machine Co.
Lewistown Foundry & Mach. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Multiplex Concrete Mach. Co.
New Holland Machine Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Smidth, F. L., & Co.
Smith Engineering Works
Sturtevant Mill Co.
Traylor Engineering & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Engineers
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Co.
Blaw-Knox Co.
Fuller Co.
Hetherington & Berner, Inc.
Link-Belt Co.
McLanahan & Stone Corp.
Morris Machine Works
Productive Equipment Corp.
Robins Conveying Belt Co.
F. L. Smidth & Co.
Sturtevant Mill Co.
Traylor Engineering & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Engines (Diesel, Gasoline, Kerosene and Oil)
Allis-Chalmers Mfg. Co.
New Holland Machine Co.
Nordberg Mfg. Co.

Engines (Natural Gas)
Allis-Chalmers Mfg. Co.

Engines (Steam)
Allis-Chalmers Mfg. Co.
Morris Machine Works
Nordberg Mfg. Co.

Exhauster
Combustion Engineering Co.
Raymond Pulverizer Division

Explosives
Du Pont, E.I., de Nemours & Co.

Fans (Exhaust & Ventilating)
Blaw-Knox Co.
Smidth, F. L., & Co.

Feeders
Allis-Chalmers Mfg. Co.
Earle C Bacon, Inc.
Barber-Greene Co.
Besser Mfg. Co.
Blaw-Knox Co.
Fuller Co.
Hetherington & Berner, Inc.
Link-Belt Co.
Link-Track Engr. Co.
Pennsylvania Crusher Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Ross Screen & Feeder Co.
Smidth, F. L., & Co.
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It is on tough, unusual jobs such as this that Lorains show up to best advantage. Built to the Center Drive design, these machines not only have the power and stamina to produce big tonnage consistently but offer the necessary mobility required for all-purpose quarry service.

That's why Lorains of 2 to ⅜ cu. yd. are preferred by those operators who want to keep material handling costs at rock bottom.

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MOVE MORE MATERIAL, FASTER AT LOWER COST

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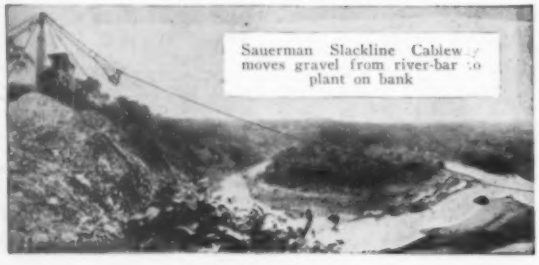

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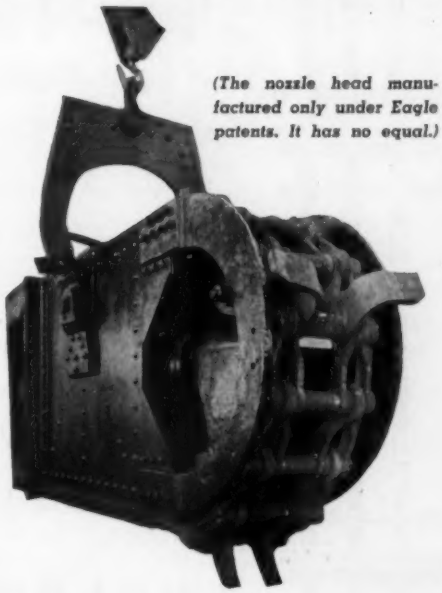

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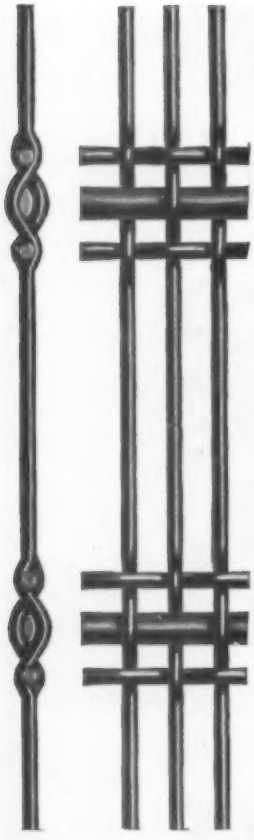

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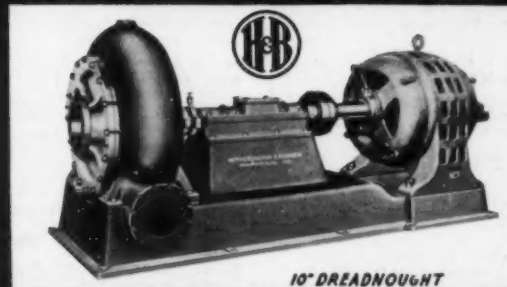

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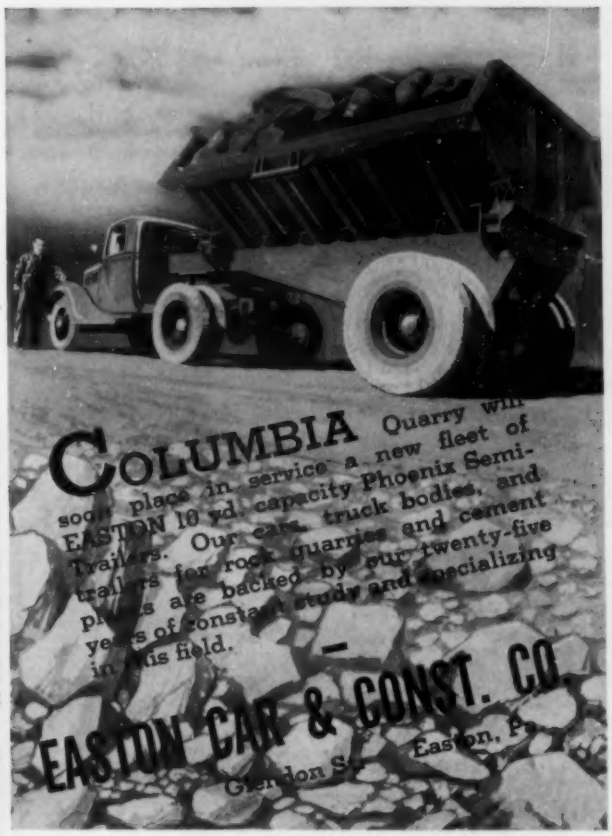
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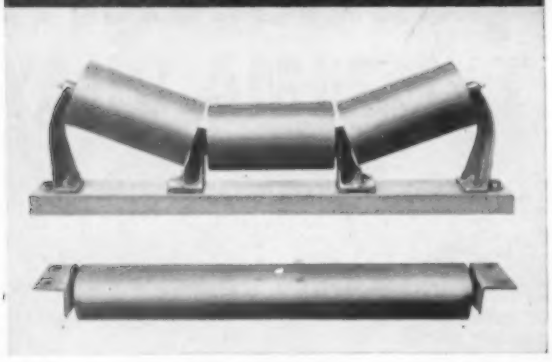

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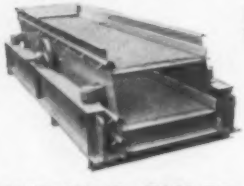

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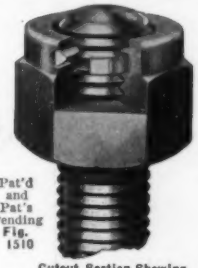

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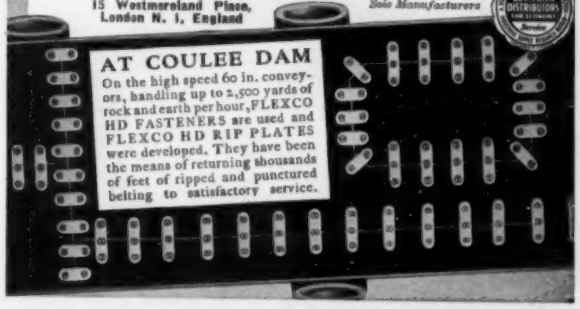

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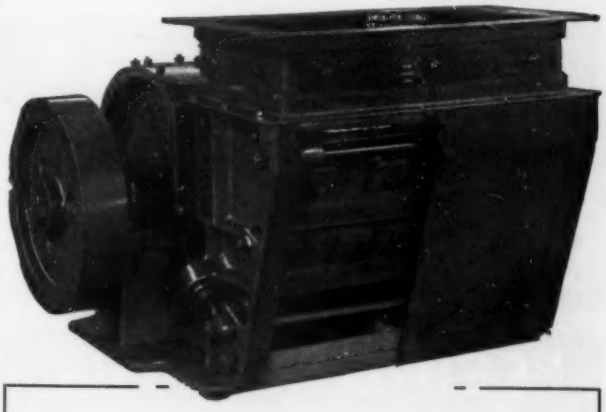

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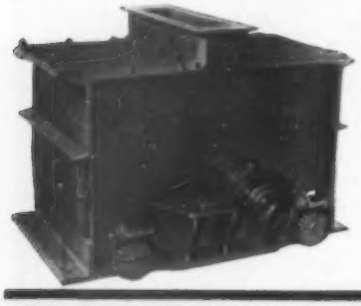

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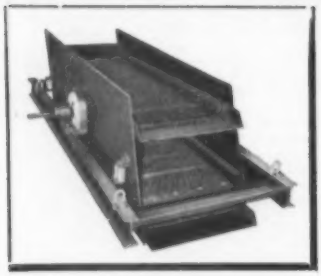

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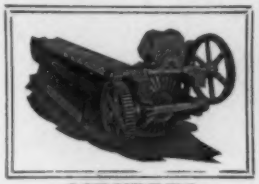

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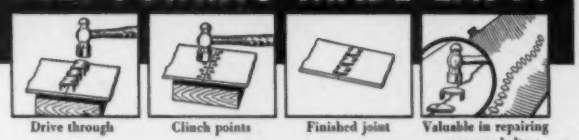

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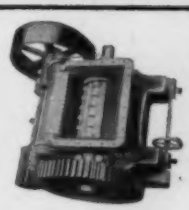

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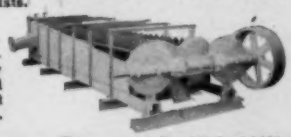

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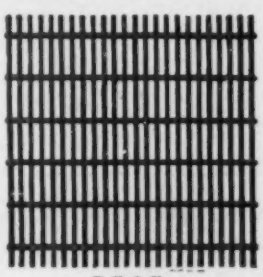

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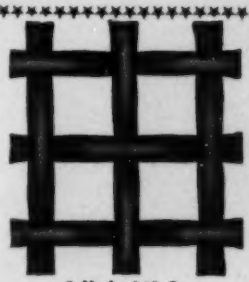

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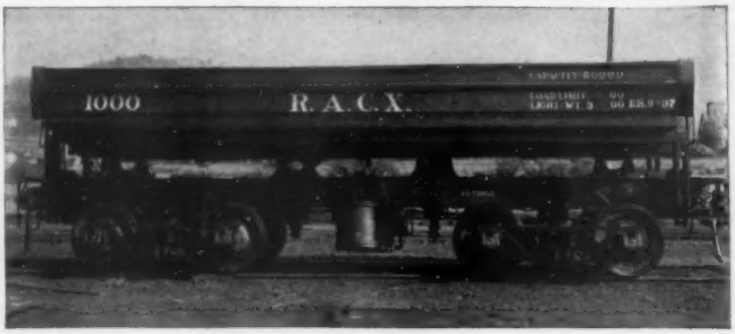

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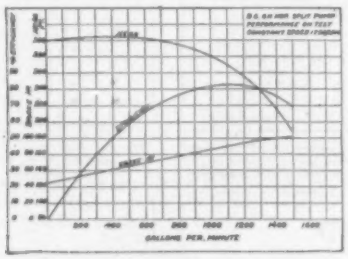

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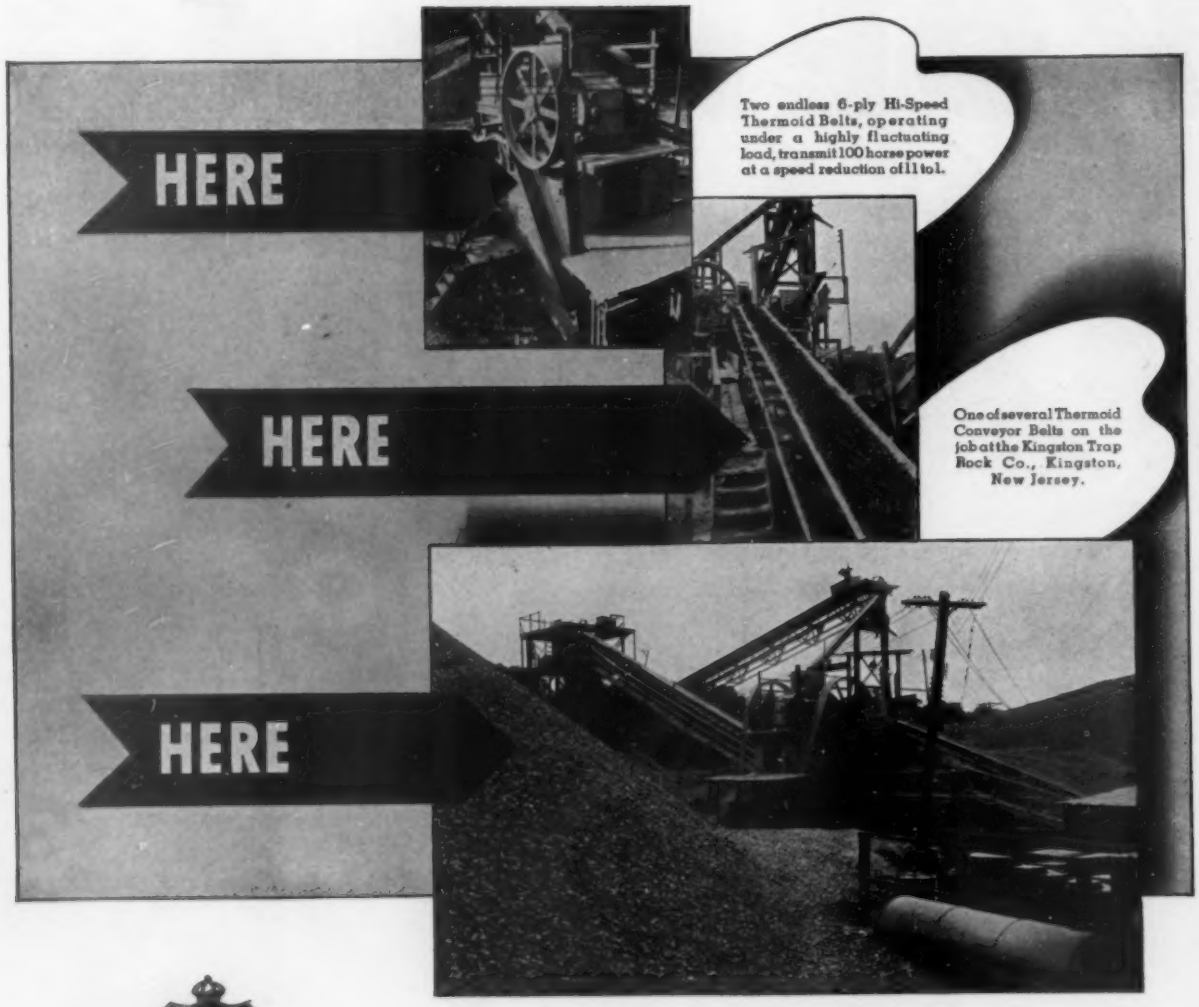
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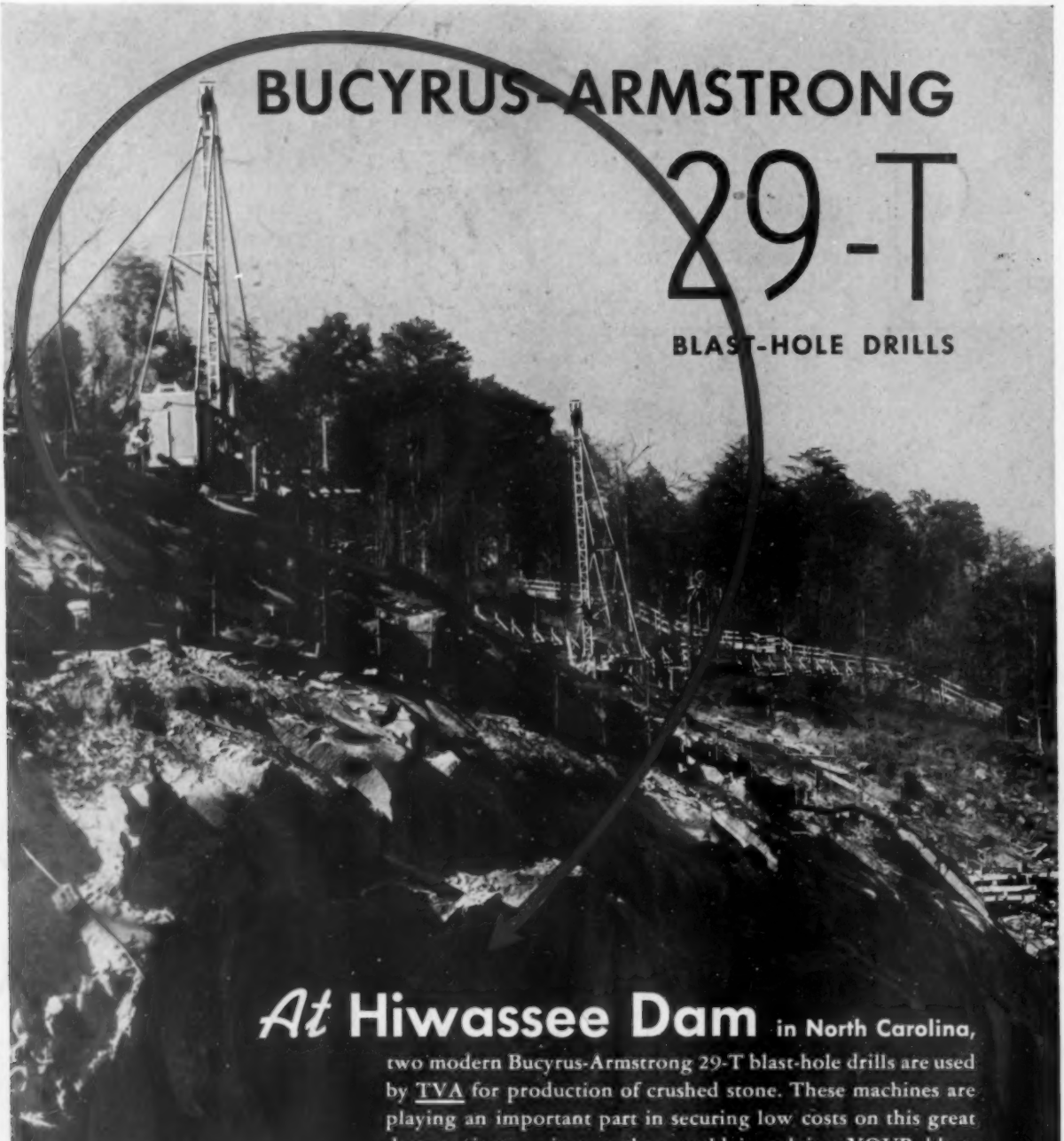

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